



# Study on National Broadband Plans in the EU-28

## **Final report**

A study prepared for the European Commission  
DG Communications Networks, Content & Technology  
by:





**This study was carried out for the European Commission by**



atene KOM GmbH |  
Agency for Communication, Organization and Management  
Invalidenstraße 91  
10115 Berlin / Germany  
Tel. +49 (0)30 / 60 98 990-0  
Fax +49 (0)30 / 60 98 990-99  
info@atenekom.eu

#### **AUTHORS**

Feldmann, Johannes (M.A., M.A., MBA)  
Khodabakhsh, Peyman (M.Sc.); Valiucko, Darijus (M.A.)  
Weber, Christina (M.A.); Beck, Christian (M.A.)

#### **Internal identification**

Contract number: 30-CE-0735856/00-93  
SMART number 2014/077

#### **DISCLAIMER**

By the European Commission, Directorate-General of Communications Networks, Content & Technology.

The information and views set out in this publication are those of the author(s) and do not necessarily reflect the official opinion of the Commission. The Commission does not guarantee the accuracy of the data included in this study. Neither the Commission nor any person acting on the Commission's behalf may be held responsible for the use which may be made of the information contained therein.

ISBN 978-92-79-66284-3  
doi: 10.2759/340045

© European Union, 2014. All rights reserved. Certain parts are licensed under conditions to the EU.

Reproduction is authorised provided the source is acknowledged



## Table of Contents

<i>Disclaimer</i> .....	9
1 Executive Summary (English) .....	11
2 Executive Summary (French) .....	23
3 Introduction .....	32
3.1 Objective of the study.....	34
3.2 Methodology and Procedure .....	35
4 Digital Agenda 2020: Towards High-Speed Internet Access in the EU .....	37
4.1 Definitions and Objectives .....	37
4.2 Gauging Progress: Key Indicators .....	38
4.2.1 Broadband Indicators: DAE targets on European and National Level .....	39
4.2.2 Socio-Economic Indicators .....	47
4.2.3 Mobile network indicators .....	50
5 Implementing the Digital Agenda 2020 .....	53
5.1 Broadband Targets: Overview of national broadband plans .....	53
5.1.1 NBPs: Differing Approaches.....	59
5.1.2 Probabilities of Achievement .....	59
5.2 Broadband Development in Practice: Member State Reports .....	61
5.2.1 Austria .....	64
5.2.2 Belgium.....	69
5.2.3 Bulgaria.....	73
5.2.4 Croatia .....	79
5.2.5 Cyprus.....	84
5.2.6 Czech Republic.....	89
5.2.7 Denmark .....	94
5.2.8 Estonia .....	99
5.2.9 Finland.....	104
5.2.10 France .....	109
5.2.11 Germany .....	113
5.2.12 Greece .....	118
5.2.13 Hungary .....	123
5.2.14 Ireland .....	128
5.2.15 Italy .....	133
5.2.16 Latvia .....	139
5.2.17 Lithuania .....	144



5.2.18	Luxembourg.....	148
5.2.19	Malta .....	153
5.2.20	The Netherlands .....	158
5.2.21	Poland.....	164
5.2.22	Portugal .....	169
5.2.23	Romania.....	174
5.2.24	Slovakia.....	180
5.2.25	Slovenia .....	186
5.2.26	Spain .....	191
5.2.27	Sweden .....	198
5.2.28	United Kingdom.....	203
6	Main Trends .....	210
6.1	Favourable conditions for NGA roll-out.....	210
6.1.1	Market pressure on the incumbent.....	210
6.1.2	Demand side activities and digitization of society as a whole.....	213
6.1.3	State aid and financial instruments.....	214
6.1.4	Regulation (AOs to access different infrastructures) .....	216
6.1.5	Population density and urbanization rate .....	216
6.1.6	Availability of ducts and upgradable networks .....	218
6.1.7	Willingness to pay and affordability .....	219
7	Good Practices for defining NBP measures.....	221
7.1	Example I: Demand Side measure – Broadband Delivery UK’s voucher scheme .....	223
7.2	Example II: Supply Side measure – National Funding Program Germany.....	224
7.3	Example III: Regulatory, Organizational measure – Symmetric regulation .....	225
7.4	Example IV: Transparency measure – Polish NBP.....	225
8	Conclusion and Outlook (revised EU targets) .....	227
9	List of Abbreviations .....	230
10	List of References.....	238
11	Annex .....	242





## *Disclaimer*

By the European Commission, Directorate-General  
of Communications Networks, Content & Technology.

The information and views set out in this publication are those  
of the author(s) and do not necessarily  
reflect the official opinion of the Commission.

The Commission does not guarantee the accuracy of the  
data included in this study. Neither the Commission nor any person  
acting on the Commission's behalf may be held responsible for the  
use which may be made of the information contained there.



## 1 Abstract – Key Findings (English)

Despite ambitious national broadband plans, only **few Member States** are close to **reaching the DAE targets or their national targets respectively**. The Member states' **NBPs highly differ regarding their content**. Few countries do currently not have a single document that can be regarded as an NBP, but all Member States however have an overall strategic approach for the deployment of NGA networks that is implemented in practice. There are a variety of **conditions that influence the success of NGA roll-out** in a given country. **Successful NBPs consider their respective starting positions and describe concrete measures** that take advantage of the individual strengths and define measures to mitigate the effect of disadvantages. The NBPs of the Member States usually set one or two foci out of the following spheres: **Demand Side measures, Supply Side measures, Regulatory and Organizational measures, Transparency measures**. **There is no one-size-fits-all solution** for broadband strategies across Europe. The NBPs seem not to be transferrable, while some measures, however, can be applied under the same conditions.



## 2 Abstract – Key Findings (French)

Malgré les plans nationaux haut débit ambitieux, **peu d'États membres sont près d'atteindre les objectifs de l'agenda numérique (DAE) ou leurs objectifs nationaux. Les NBP des États membres diffèrent fortement concernant leur contenu.** Peu de pays ne disposent pas actuellement d'un document unique qui peut être considéré comme un NBP, mais tous les États membres ont une approche stratégique générale pour le déploiement des réseaux d'accès de nouvelle génération (NGA) et leur mise en œuvre pratique. **Il existe de nombreuses conditions qui ont une influence sur le succès du déploiement des réseaux NGA. Des NBP efficaces considèrent leurs propres positions de départ et proposent des mesures concrètes** exploitant les forces individuelles et définissant des mesures pour atténuer l'effet des inégalités. Les NBP des États membres établissent généralement un ou deux points prioritaires dans les domaines suivants : **les mesures afférentes à l'offre, les mesures afférentes à la demande, les mesures réglementaires et organisationnelles, les mesures de transparence. Il n'y a pas d'approche universelle** pour les stratégies haut débit à travers l'Europe. Il semble que les NBP ne soient pas transférables, tandis que certaines mesures peuvent cependant être appliquées partout dans les mêmes conditions.



### 3 Executive Summary (English)

The following study on National Broadband Plans (NBPs) in the EU-28 (SMART 2014/0077) was conducted between November 2015 and September 2016. For our analysis, we mainly relied on information obtained from the European Commission and National authorities. Furthermore, we reached out to key stakeholders and practitioners from the 28 Member States to gain insights concerning the actual implementation of the national broadband plans in each respective country. Overall, the study presented shall give an overview on the current state of the Member States regarding their connectivity, the targets and measures defined within the NBPs and the actual practical implementation processes. The main results of the study are as follows:

- 1) Despite ambitious national broadband plans, only **few Member States** are close to **reaching the DAE targets or their national targets respectively**.
- 2) The Member states' **NBPs highly differ regarding their content**. Few countries do currently not have a single document that can be regarded as an NBP, but all Member States however have an overall strategic approach for the deployment of NGA networks that is implemented in practice.
- 3) There are a variety of **conditions that influence the success of NGA roll-out** in a given country. **Successful NBPs consider their respective starting positions and describe concrete measures** that take advantage of the individual strengths and define measures to mitigate the effect of disadvantages.
- 4) The NBPs of the Member States usually set one or two foci out of the following spheres: **Demand Side measures, Supply Side measures, Regulatory and Organizational measures, Transparency measures**.
- 5) **There is no one-size-fits-all solution** for broadband strategies across Europe. The NBPs seem not to be transferrable, while some measures, however, can be applied under the same conditions.

I. Concerning the probabilities of reaching the DAE targets, we have analysed that currently only 14 out of the 28 Member States defined their own national targets. The other countries follow the Digital Agenda for Europe. However, only few countries have high probabilities to reach their targets. As shown by the following table, we are not convinced that any EU Member State will reach its own target. Nonetheless, there are several countries that have decent chances to meet the DAE targets by

2020. Generally, the results of the study reinforce the need to increase and incentivise investment. If Europe does not want to lag behind at global level, broadband development needs to speed up. In this regard, the provision and exploitation of fast and ultrafast internet services is crucial for Europe's future economic development and competitiveness as well as for the progress and cohesion of society as a whole. With the Digital Agenda 2020 and the recently published new European broadband targets for 2025, the European Commission has set up a substantial framework for the future digital advancement of Europe. For Europe to fully take advantage of this framework and thus to realise the full potential of digital development, all relevant stakeholders need to maximise their efforts. Member States have to provide appropriate incentives and means for increasing investment whilst local actors and the ICT industry need to make use of these instruments. In that sense, Member States should build on existing successful measures, but be more ambitious, not only in terms of incentives and means, but also, especially with regard to the new European ambitions for 2025, in terms of objectives, thereby ensuring Europe's future economic and social progress.

Table 1 summarizes all NBP's targets, the current state of connectivity and our estimations concerning the probability of meeting the national targets and the DAE targets respectively.



State of connectivity DESI (July 2015)			NBP Targets		
Member State	Coverage (NGA) 30 Mbps	Take up (calculated as of households) 100 Mbps and more	Coverage	Take-up	Probability of achievement (DAEII / DAE III / National target)
Austria	88.8 %	2.24%	99 % coverage with 100 Mbps by 2020 / 70 % until 2018	N/A	Medium / low / low
Belgium	98.9 %	22.77%	N/A	50 % HH penetration with 1 Gbps service by 2020	High / high / medium
Bulgaria	71.8 %	2.88%	100 % coverage with 30 Mbps by 2020	50 % of households and 80 % of businesses subscribing to >100 Mbps by 2020	Low / low / medium (80 % of businesses with 100 Mbps)
Croatia	52.0 %	0.12%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	Low / low / N.A.
Cyprus	84.0 %	0.06%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	Medium / low / N.A.
Czech Republic	72.9 %	5.55%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	Low / low / N.A.
Denmark	91.7 %	9.39%	100 % coverage with 100 Mbps download and 30 Mbps upload by 2020	N/A	Medium / medium / low
Estonia	86.4 %	4.48%	100 % coverage with 30 Mbps by 2020	60 % HH penetration with 100 Mbps service by 2020	High / low / low

State of connectivity DESI (July 2015)						NBP Targets	
Member State	Coverage (NGA) 30 Mbps	Take up (calculated as of households) 100 Mbps and more	Coverage	Take-up	Probability of achievement (DAEII / DAE III / National target)		
Finland	75.1 %	15.11%	99 % of all permanent residences and offices should be located within 2 km of an optic fibre network or cable network that enables connections of 100 Mbps by 2019	N/A	Low / medium / medium		
France	44.8 %	7.66%	100 % coverage with 30 Mbps by 2022	N/A	Low / low / medium		
Germany	81.4 %	4.82%	100 % coverage with 50 Mbps by 2018	N/A	Medium / low / medium		
Greece	36.3 %	0.01%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	Low / low / N.A.		
Hungary	78.2 %	12.68%	100 % coverage with 30 Mbps by 2018	50 % HH penetration with 100 Mbps service by 2020	Medium / medium / medium		
Ireland	79.7 %	13.24%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020, expecting upstream bandwidths around 17 to 21 Mbps	Low / low / N.A.		
Italy	43.9 %	0.54%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	Low / low / N.A.		
Latvia	90.7 %	25.30%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	Medium / medium / N.A.		

State of connectivity DESI (July 2015)				NBP Targets	
Member State	Coverage (NGA) 30 Mbps	Take up (calculated as of households 100 Mbps and more)	Coverage	Take-up	Probability of achievement (DAEII / DAE III / National target)
Lithuania	97.5 %	10.42%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	High / medium / N.A.
Luxembourg	94.4 %	7.33%	100 % coverage with 1 Gbps downstream and 500 Mbps upstream by 2020	N/A	High / low / medium
Malta	100.00 %	0.99%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	Target met / low / N.A.
Netherlands	98.3 %	16.53%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	High / low / N.A.
Poland	60.7 %	4.23%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	Low / low / N.A.
Portugal	90.9 %	18.88%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	Medium / medium / N.A.
Romania	71.6 %	26.72%	80 % coverage with 30 Mbps by 2020	45 % HH penetration with 100 Mbps service by 2020	Medium / medium / medium
Slovakia	67.1 %	6.70%	100 % coverage with 30 Mbps by 2020	N/A	Low / low / N.A.
Slovenia	78.8 %	4.91%	96 % coverage with 100 Mbps, 4% coverage 30 Mbps by 2020	N/A	Low / low / low

State of connectivity DESI (July 2015)			NBP Targets		
Member State	Coverage (NGA) 30 Mbps	Take up (calculated as of households 100 Mbps and more)	Coverage	Take-up	Probability of achievement (DAEII / DAE III / National target)
Spain	76.6 %	9.76%	100 % coverage with 30 Mbps by 2020	50 % HH penetration with 100 Mbps service by 2020	Low / medium / N.A.
Sweden	76.4 %	27.06%	90 % coverage with 100 Mbps by 2020	N/A	Low / medium / medium
United Kingdom	90.5 %	6.15%	95 % coverage with 24 Mbps by 2017. At least 100 Mbps for nearly all UK premises (no date)	N/A	Medium / low / medium

Table 1 DAE and NBP targets – Probability of achievement (Executive Summary ENG)

II. Concerning the content of the NBPs, we have seen very different approaches. It is however striking that those countries with favourable conditions for market-driven roll-out (e.g. high population density, high demand, high degree of urbanization, extensive cable networks) are often less concrete regarding the measures described in their respective NBPs. They usually rely on strategic approaches that define the overall framework under which competition shall take place. These countries often consequently trust in market forces for further NGA coverage. In these cases, an NBP is mainly designed to provide for a level playing field, meaning that fair competition can take place. Contrarily, those countries with more difficult starting positions are often advanced concerning the definiteness of the measures described. According to their respective economic capabilities, they try to increase supply, demand or transparency regarding existing infrastructures. The different NBPs then usually subsequently incorporate measures accordingly in a single strategy document, guidelines, legislation etc.

However, what we learned from practitioners across Europe is that the overall national strategy does not have to be part of a single document to be effective. As long as there is political determination to reach certain targets with certain measures, also a loose collection of statements and documents can still lead to positive results. Most important concerning the actual implementation, however, seems to be that responsible actors (usually at local level) are attached to the strategic targets and feel involved. Generally speaking, the involvement of local actors is especially important when countries of usually larger size have significantly lower rural coverage and need demand aggregation and bottom-up initiatives.

III. There are several conditions that influence the success of NGA roll-out. Some of these are competition, demand side activities and digitization of a society, the availability of state aid and financial instruments, a decent regulatory framework, population density and urbanization rate, availability of ducts and upgradable networks as well as willingness to pay and affordability. This list is not comprehensive. Thus it is difficult to evaluate the “success” of NBPs. They can only be relatively successful given their circumstances. If the conditions described above are negative, defining an NBP to counter these conditions is a lot more challenging than writing an NBP within an environment that favours NGA roll-out anyway. However, what is often missing within NBPs, is the consideration of what the actual situation in a country is. There is a vast unused potential where countries could improve their NBPs by analysing the respective environments in a better way. The decency of an NBP can therefore not be evaluated by analysing a singular aspect such as achieving the connectivity targets, but rather if the NBP is well adjusted to local needs and conditions.

IV. The adjustments described above are at least partly reflected by the thematic focus of the NBP. We recognize four different spheres of influence where NBPs can define measures in (regarding demand, supply, organizational and regulatory approach as well as transparency). Although it is often difficult to determine the focus of an NBP, we decided to cluster them by evaluating where the most concrete and measurable provisions are taken to support NGA roll-out in a given country.

As shown in Figure 1, we see that the Member States are somewhat evenly distributed regarding their approaches and foci within the spheres of influence. However, one has to bear in mind that this focus only represents how well-defined measures are, meaning if they are underpinned by clear responsibilities and plans of their implementation. The foci, however, do not tell anything about the actual feasibility of the plans.

V. This also leads to the final conclusion: There is no one-size-fits-all approach concerning a “best” broadband strategy. All Member States have unique starting positions that make results hardly transferrable. The member states differ regarding their governmental structures as well as regarding the degree of involvement of local and regional actors. The size of a country as well as autonomous regions and federal structures often directly influence the steering modalities and capabilities. Furthermore, macroeconomic aspects matter as much as socio-economic aspects. Economic hardships decrease investments and demand alike, worsening the situation in crisis-struck countries. Other aspects include the role of the incumbent and the quality of existing infrastructures. In some countries, mobile technologies are an important aspect of connectivity and partly substitute fixed networks. All of these factors and several others can and will influence the state of connectivity within given countries, making it difficult to transfer approaches. Measures that lead to excellent results in one country might bring negative results in other countries. It is therefore most important to regard NBPs in the same way as the countries they belong to: unique.



Figure 1 Focus of NBPs (Executive Summary ENG)

## 4 Executive Summary (French)

L'étude suivante sur les plans nationaux haut débit (NBP) dans l'UE à 28 (SMART 2014/0077) a été menée entre novembre 2015 et septembre 2016. Pour notre analyse, nous nous sommes appuyés principalement sur des informations obtenues auprès de la Commission européenne et des autorités nationales. Par ailleurs, nous avons contacté des parties prenantes clés et des praticiens des 28 États membres pour nous faire une idée concernant la mise en œuvre concrète des plans nationaux haut débit dans chaque pays respectif. Plus généralement, l'objet de cette étude est de donner un aperçu sur la situation actuelle des États membres en ce qui concerne leur connectivité, les objectifs et les mesures définis dans les NBPs, et les actions pratiques réellement réalisées. Les principaux résultats de l'étude sont les suivants :

- 1) Malgré les plans nationaux haut débit ambitieux, **seuls un petit nombre d'États membres sont près d'atteindre les objectifs de l'agenda numérique (DAE) ou leurs objectifs nationaux respectifs.**
- 2) **Les NBPs des États membres diffèrent fortement concernant leur contenu.** Peu de pays ne disposent pas actuellement d'un document unique qui peut être considéré comme un NBP, mais tous les États membres ont cependant une approche stratégique générale pour le déploiement des réseaux d'accès de nouvelle génération (NGA) et leur mise en œuvre pratique.
- 3) **Il existe de nombreuses conditions qui ont une influence sur le succès du déploiement des réseaux NGA** dans un pays donné. **Des NBPs efficaces considèrent leurs propres positions de départ et proposent des mesures concrètes** exploitant les forces individuelles et définissant des mesures pour atténuer l'effet des inégalités.
- 4) Les NBPs des États membres établissent généralement un ou deux points prioritaires dans les domaines suivants : **les mesures afférentes à l'offre, les mesures afférentes à la demande, les mesures réglementaires et organisationnelles, les mesures de transparence.**
- 5) **Il n'y a pas d'approche universelle** pour les stratégies haut débit à travers l'Europe. Il semble que les NBPs ne soient pas transférables, tandis que certaines mesures peuvent cependant être appliquées partout dans les mêmes conditions.

I. En ce qui concerne les probabilités d'atteindre les objectifs du DAE, nous avons analysé qu'actuellement seulement 14 des 28 États membres ont défini leurs propres objectifs nationaux. Les autres pays suivent l'agenda numérique européen. Cependant, seuls quelques pays ont des probabilités élevées

d'atteindre leurs objectifs propres. Comme le montre le tableau suivant, nous ne sommes pas convaincus que tous les États membres de l'UE puissent y arriver. Cependant, il y a plusieurs pays qui ont des chances raisonnables d'atteindre les objectifs du DAE d'ici 2020. En général, les résultats de l'étude renforcent la nécessité d'accroître et de stimuler les investissements. Si l'Europe ne veut pas être à la traîne au niveau mondial, le développement haut débit doit accélérer. À cet effet, la fourniture et l'exploitation des services Internet rapides et ultrarapides est cruciale pour le futur développement économique et la compétitivité de l'Europe ainsi que pour le progrès et la cohésion de la société dans son ensemble. Avec l'agenda numérique européen 2020 et les nouveaux objectifs haut débit européens pour 2025 récemment publiés, la Commission européenne a mis en place un cadre substantiel pour le futur avancement numérique de l'Europe. Pour que l'Europe puisse tirer pleinement profit de ce cadre et donc réaliser le plein potentiel du développement numérique, tous les parties prenantes doivent maximiser leurs efforts. Les États membres doivent fournir des incitations appropriées et des moyens pour accroître les investissements, alors que les acteurs locaux et l'industrie des télécommunications doivent faire usage de ces instruments. En ce sens, les États membres doivent consolider les mesures efficaces existantes, mais être plus ambitieux, non seulement en termes d'incitations et de moyens, mais aussi, en particulier prenant en considération les nouvelles ambitions européennes pour l'année 2025, en termes d'objectifs, assurant ainsi le progrès social et économique de l'Europe.

Le Table 2 résume les objectifs de tous les NBPs, l'état actuel de la connectivité et nos estimations concernant la probabilité d'atteindre respectivement les objectifs nationaux et les objectifs du DAE.



État de la connectivité DESI (Juillet 2015)		NBP Objectifs			
États membres	Couverture (NGA) 30 Mbps	Pénétration (en taux de ménages) 100 Mbps et plus	Couverture	Pénétration	Probabilité de la réalisation (DAEII / DAE III / Objectif national)
Allemagne	81,4 %	4,82 %	100 % de couverture avec 50 Mbps d'ici 2018	Non disponible	Moyenne / faible / moyenne
Autriche	88,8 %	2,24 %	99 % de couverture avec 100 Mbps d'ici 2020, 70 % d'ici 2018	Non disponible	Moyenne / faible / faible
Belgique	98,9 %	22,77 %	Non disponible	Taux de pénétration dans les ménages de 50 % avec un service de 1 Gbps d'ici 2020	Haute / haute / moyenne
Bulgarie	71,8 %	2,88 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux d'abonnement > 100 Mbps de 50 % dans les ménages et de 80 % dans les entreprises d'ici 2020	Faible / faible / moyenne ( 80 % 100 Mbps dans les entreprises
Chypre	84,0 %	0,06 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Moyenne / faible / non disponible
Croatie	52,0 %	0,12 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Faible / faible / non disponible
Danemark	91,7 %	9,39 %	100 % de couverture avec 100 Mbps en débit descendant et 30 Mbps en débit montant d'ici 2020	Non disponible	Moyenne / moyenne / faible
Espagne	76,6 %	9,76 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Faible / moyenne / non disponible

État de la connectivité DESI (Juillet 2015)		NBP Objectifs			
États membres	Couverture (NGA) 30 Mbps	Pénétration (en taux de ménages) 100 Mbps et plus	Couverture	Pénétration	Probabilité de la réalisation (DAEII / DAE III / Objectif national)
Estonie	86,4 %	4,48 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 60 % avec un service de 100 Mbps d'ici 2020	Haute / faible / faible
Finlande	75,1 %	15,11 %	99 % de toutes les résidences permanentes et bureaux doivent être situés à 2 km d'un réseau de fibre optique ou d'un réseau câblé qui permette des connexions de 100 Mbps d'ici 2019	Non disponible	Faible / moyenne / moyenne
France	44,8 %	7,66 %	100 % de couverture avec 30 Mbps d'ici 2022	Non disponible	Faible / faible / moyenne
Grèce	36,3 %	0,01 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Faible / faible / non disponible
Hongrie	78,2 %	12,68 %	100 % de couverture avec 30 Mbps d'ici 2018	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Moyenne / moyenne / moyenne
Irlande	79,7 %	13,24 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020, avec, en attendant, un débit montant d'environ 17 à 21 Mbps	Faible / faible / non disponible
Italie	43,9 %	0,54 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Faible / faible / non disponible

État de la connectivité DESI (Juillet 2015)		NBP Objectifs			
États membres	Couverture (NGA) 30 Mbps	Pénétration (en taux de ménages) 100 Mbps et plus	Couverture	Pénétration	Probabilité de la réalisation (DAEII / DAE III / Objectif national)
Lettonie	90,7 %	25,30 %	100 % couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Moyenne / moyenne / non disponible
Lituanie	97,5 %	10,42 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Haute / moyenne / non disponible
Luxembourg	94,4 %	7,33 %	100 % de couverture avec 1 Gbps en débit descendant et 500 Mbps en débit montant d'ici 2020	Non disponible	Haute / faible / moyenne
Malte	100,00 %	0,99 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Objectif réalisé / faible / non disponible
Pays-Bas	98,3 %	16,53 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Haute / faible / non disponible
Pologne	60,7 %	4,23 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Faible / faible / non disponible
Portugal	90,9 %	18,88 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Moyenne / moyenne / non disponible
République tchèque	72,9 %	5,55 %	100 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 50 % avec un service de 100 Mbps d'ici 2020	Faible / faible / non disponible

État de la connectivité DESI (Juillet 2015)		NBP Objectifs			
États membres	Couverture (NGA) 30 Mbps	Pénétration (en taux de ménages) 100 Mbps et plus	Couverture	Pénétration	Probabilité de la réalisation (DAEII / DAE III / Objectif national)
Roumanie	71,6 %	26,72 %	80 % de couverture avec 30 Mbps d'ici 2020	Taux de pénétration dans les ménages de 45 % avec un service de 100 Mbps d'ici 2020	Moyenne / moyenne / moyenne
Royaume-Uni	90,5 %	6,15 %	95 % de couverture avec 24 Mbps d'ici 2017 et au moins 100 Mbps pour presque tous les édifices du Royaume-Uni (sans date)	Non disponible	Moyenne / faible / moyenne
Slovaquie	67,1 %	6,70 %	100 % de couverture avec 30 Mbps d'ici 2020	Non disponible	Faible / faible / non disponible
Slovénie	78,8 %	4,91 %	96 % de couverture avec 100 Mbps et 4 % avec 30 Mbps d'ici 2020	Non disponible	Faible / faible / faible
Suède	76,4 %	27,06 %	90 % de couverture avec 100 Mbps d'ici 2020	Non disponible	Faible / moyenne / moyenne

Table 2 DAE and NBP targets – Probability of achievement (Executive Summary FR)

II. En ce qui concerne le contenu des NBP, nous avons remarqué des approches très différentes. Il est cependant frappant de constater que les pays ayant des conditions favorables pour un déploiement fondé sur la dynamique du marché (par exemple une densité de population élevée, une forte demande, un degré élevé d'urbanisation, de vastes réseaux câblés) sont souvent moins concrets concernant les mesures décrites dans leurs NBP respectifs. Par conséquent, ils comptent généralement sur des approches stratégiques qui définissent le cadre général dans lequel la concurrence doit avoir lieu. Ces pays souvent se fient exclusivement aux forces du marché pour une couverture NGA supplémentaire. Dans ces cas, un NBP est principalement élaboré pour fournir des conditions de concurrence égales, ce qui signifie qu'une compétition équitable peut avoir lieu. Au contraire, les pays ayant des positions de départ plus difficiles sont souvent plus avancées concernant le réalisme des mesures décrites. Selon leurs capacités économiques, ils essaient d'accroître l'offre, la demande ou la transparence relative aux infrastructures existantes. Ensuite, les différents NBP intègrent généralement ces mesures dans un document unique de stratégie, des directives, une législation, etc.

Néanmoins, ce que nous avons appris des professionnels à travers l'Europe est que la stratégie nationale générale ne doit pas faire partie d'un seul document pour être efficace. Tant qu'il existe une volonté politique d'atteindre certains objectifs avec certaines mesures, un recueil approximatif de déclarations et de documents peut effectivement fonctionner. Cependant, il apparaît que l'aspect le plus important concernant la mise en œuvre effective est que les acteurs responsables (généralement au niveau local) soient attachés aux objectifs stratégiques et s'y sentent associés. D'une manière générale, la participation des acteurs locaux est particulièrement importante lorsque les pays de grande superficie, qui ont généralement une couverture rurale significativement faible, ont besoin d'associer la demande et les initiatives prises par la base (*bottom-up*).

III. Il y a plusieurs conditions qui influent sur le succès du déploiement des réseaux NGA. Les principales sont la concurrence, les activités afférentes à la demande et à la numérisation de la société, la disponibilité des aides de l'État et des instruments financiers, un cadre réglementaire décent, la densité de population et le taux d'urbanisation, la disponibilité des réseaux, et que ceux-ci soient modernisables, ainsi que la volonté de mettre la main à la poche et l'accessibilité financière. Cette liste n'est pas complète. Il est donc difficile d'évaluer le « succès » des NBP. Ils ne peuvent réussir que relativement à des circonstances particulières. Si les conditions décrites ci-dessus sont négatives, la définition d'un NBP pour les contrer sera beaucoup plus difficile que d'écrire un NBP pour un environnement qui favorise de toute façon le déploiement NGA. Cependant, ce qui manque souvent dans un NBP est la prise en considération de la situation réelle dans le pays. Il y a un vaste potentiel inexploité où les États pourraient améliorer leurs NBP en analysant mieux les environnements respectifs. La qualité d'un

NBP ne peut donc pas être évalué en analysant un aspect singulier, comme la réalisation des objectifs de connectivité, mais plutôt si le NBP est bien adapté aux besoins et aux conditions locales.

IV. Les ajustements décrits ci-dessus sont au moins partiellement reflétés par l'accent thématique du NBP. Nous reconnaissons quatre sphères d'influence différentes où les NBPs peuvent définir des mesures (en ce qui concerne la demande, l'offre, l'approche organisationnelle et réglementaire ainsi que la transparence). Bien qu'il soit souvent difficile de déterminer le domaine prioritaire d'un NBP, nous avons décidé de les regrouper en évaluant les dispositions les plus concrètes et les plus mesurables qui sont prises pour soutenir le déploiement NGA dans un pays donné.

Comme le montre la Figure 2, nous voyons que les États membres sont quelque peu répartis de manière égale en ce qui concerne leur approche et leur importance en fonction des sphères d'influence. Cependant, il faut se rappeler que cette répartition ne représente que les mesures envisagées, ce qui signifie qu'elles doivent être étayées par les responsabilités claires et les plans de mise en œuvre. La répartition cependant ne dit rien au sujet de la faisabilité réelle des plans.



Figure 2 Focus of NBPs (Executive Summary FR)

V. Cela conduit aussi à la conclusion finale : il n'y a pas d'approche universelle concernant une stratégie haut débit optimale. Tous les États membres ont des positions de départ individuelles qui rendent les résultats difficilement transférables. Les États membres sont différents en ce qui concerne leurs structures gouvernementales ainsi que le degré d'implication des acteurs locaux et régionaux. La taille d'un pays ainsi que les régions autonomes et les structures fédérales influent souvent directement sur les modalités et les capacités de direction. En outre, les aspects macro-économiques comptent autant que les aspects socio-économiques. Les difficultés économiques diminuent les investissements comme la demande, aggravant la situation dans les pays en crise. D'autres aspects comprennent le rôle de l'opé-

rateur historique et la qualité des infrastructures existantes. Dans certains pays, les technologies mobiles sont un aspect important de la connectivité et remplace partiellement les réseaux fixes. Tous ces facteurs et plusieurs autres peuvent et vont influencer sur l'état de la connectivité dans les pays donnés, ce qui rend difficile le transfert des approches. Les mesures qui conduisent à d'excellents résultats dans un pays pourraient mener à des résultats négatifs dans d'autres pays. Il est donc plus important de considérer les NBPs de la même manière que les pays auxquels ils appartiennent : comme étant unique.

## 5 Introduction

Broadband connectivity is of strategic importance for technological innovation and economic growth across sectors and, as such, forms a key ingredient of social and regional cohesion within the European Union (EU). The Digital Agenda for Europe (hereinafter DAE or Digital Agenda) provides a central policy framework in this regard. It represents one of the flagship initiatives of the EU in the context of the Europe 2020 strategy, devised to deliver smart, sustainable and inclusive growth and render the EU globally more competitive in the long-run.<sup>1</sup> The DAE's overall aim is thereby "to deliver sustainable economic and social benefits from a digital single market based on fast and ultra-fast internet and interoperable applications".<sup>2</sup> This is of utmost importance as the future economy will be knowledge-based with the internet at its centre. Against this background, the EU set two overarching broadband targets to be met by its member states by 2020:<sup>3</sup>

- all Europeans should have access to internet speeds higher than 30 Mbps,
- and 50% or more of European households should be able to obtain subscriptions above 100 Mbps

In this light, the DAE envisages a number of measures to foster the deployment of networks required to meet its central objectives as well as to support substantial investments required in the upcoming years. At EU level, investments in high-speed broadband are supported through a variety of policy, regulatory and financing as well as funding measures. These include:

Funding/Financing initiatives:

- The European plan for Investment supported by the European Fund for Strategic Investment (EFSI)<sup>4</sup>;
- The European Structural and Investment Funds (ESIFs) for the 2014-2020 periods;
- The Connecting Europe Facility (CEF)<sup>5</sup>;

---

<sup>1</sup> [http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/flagship-initiatives/index\\_en.htm](http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/flagship-initiatives/index_en.htm)

<sup>2</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0245&from=EN>

<sup>3</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0472&from=EN>, <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0245&from=EN>

<sup>4</sup> [http://ec.europa.eu/priorities/jobs-growth-investment/plan/index\\_en.htm](http://ec.europa.eu/priorities/jobs-growth-investment/plan/index_en.htm)

<sup>5</sup> <http://ec.europa.eu/digital-agenda/en/connecting-europe-facility>



#### Regulatory measures:

- The Cost Reduction Directive<sup>6</sup>;
- The new Broadband State Aid Guidelines<sup>7</sup> and the new General Block Exemption Regulation (GBER)<sup>8</sup>;
- The Telecoms Single Market (TSM) and upcoming review<sup>9</sup>;
- The Digital Single Market Strategy<sup>10</sup>;

#### Policy guidance and support:

- The EC Guide to high speed broadband investment<sup>11</sup>;
- The Broadband Europe website<sup>12</sup>;
- The Connected Communities Initiative<sup>13</sup>;

At national level, most Member States (MS) have gradually adopted National Broadband Plans (NBPs), devised to integrate all relevant aspects to develop an effective broadband policy and resources enabling policy makers and public authorities to properly plan public interventions in the telecommunications sector. The implementation of the NBPs plans thereby usually falls within the competence area of the MS' responsible ministries.

Besides financing from the private sector, national projects for network roll-out are also funded from national public funds and from the EU, via the European Regional Development Fund and the European Agricultural Fund for Rural Development. For the period 2014-2020, 22 Member States have allocated ERDF and/or EAFRD funding to broadband deployment, totalling approximately EUR 6 billion. Noteworthy is that there are considerable differences between Member States in terms of net amounts and percentages of ERDF and/or EAFRD funds earmarked for broadband deployment. The CEF (Connecting Europe Facility) and the EFSI (European Fund for Strategic Investment) provide additional fi-

---

<sup>6</sup> <http://ec.europa.eu/digital-agenda/en/measures-reduce-cost-high-speed-broadband-roll-out-0>

<sup>7</sup> [http://ec.europa.eu/competition/state\\_aid/legislation/specific\\_rules.html](http://ec.europa.eu/competition/state_aid/legislation/specific_rules.html)

<sup>8</sup> [http://ec.europa.eu/competition/state\\_aid/legislation/block.html#gber](http://ec.europa.eu/competition/state_aid/legislation/block.html#gber)

<sup>9</sup> <https://ec.europa.eu/digital-agenda/en/connected-continent-legislative-package>

<sup>10</sup> <http://ec.europa.eu/priorities/digital-single-market/>

<sup>11</sup> <http://ec.europa.eu/digital-agenda/en/news/broadband-investment-guide>

<sup>12</sup> <http://ec.europa.eu/digital-agenda/en/broadband-europe>

<sup>13</sup> <https://ec.europa.eu/digital-agenda/en/node/70418>

financial instruments (e.g. guarantees, loans, equity) to support innovative business models. The European Structural and Investment Funds also encourage the use of financial instruments for broadband deployment.<sup>14</sup>

A staff working document by the European Commission on the Implementation of National Broadband Plans posits that broadband dynamics are necessarily shaped by idiosyncratic factors such as local geography and roll-out costs, the competitive situation in the national broadband market, the general legal framework, various socio-economic factors and differing attitudes towards the scope and design of state intervention.<sup>15</sup> Taking it from there, the paper argues that forms of national implementation will continue to vary, despite the uniformity imposed by EU legislation and coordination measures such as the common regulatory and state aid frameworks. These observations underline, at the very minimum, that a “one-size-fits-all” solution is unlikely to evolve.

Overall, Member States need to devise appropriate strategies and instruments in order to reach set targets. Notably, progress with respect to reaching the high-speed broadband targets of the DAE is variable, with some Member States lagging behind and others being in an advanced stage of implementing their national strategies. Providing a succinct picture of recent developments across countries will thus be vital as a means to identify deficiencies and point out ameliorative measures where necessary.

## 5.1 Objective of the study

The absence of a universally applicable “recipe” in the area of broadband development inherently raises the question about what kind of specific strategies Member States pursue (i.e. National Broadband Plans) and through what means and within what period they aim at meeting the DAE2020 targets, or their own respectively. In this light, the task is to examine the current state of affairs concerning broadband development in the EU-28 Member States. Thus, the focus of the study is rather on the actual implementation processes than on political statements or the content of official documents.<sup>16</sup>

Correspondingly, the main objective is to review the national broadband plans of the Member States, the assessment of their feasibility and evaluation of the likelihood of achieving the EU’s DAE2020 targets as well as the identification of main trends and best practices across Member States.

---

<sup>14</sup> [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=9990](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=9990)

<sup>15</sup> [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=914](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=914)

<sup>16</sup> Minutes from the project-related inception meeting that took place on 3rd of November 2015 in Brussels.

## 5.2 Methodology and Procedure

The overall methodological approach for this study is an inductive one, meaning that we gather several single observations and derive generally applicable patterns from these observations.

In order to be able to provide a cohesive picture of the process of broadband development in all Member States, we defined a mixed methodology, combining quantitative and qualitative elements to be the most appropriate approach. While the quantitative approach is being applied to provide a sound understanding of the status quo across Europe, the qualitative approach will deliver insights for current and future developments. A key characteristic of qualitative methodology is its ability to deliver a “thick analysis” which allows for an in-depth examination of processes and (expected) outcomes by relying on rich and dense information concerning specific cases.<sup>17</sup> In addition, statistical figures are included in the analysis where available to provide for context and support the validity of the qualitative findings. Likewise, different visualization tools are utilized to facilitate understanding. The form of gathered data will to a certain degree determine the way of presentation.

In collecting the necessary data, we adopted multiple tools including desk-research, surveys and interviews with leading experts from each (or groups of) Member States in the area of broadband development. The surveys and interviews thereby followed a semi-structured design which allowed to identify salient issues and challenges in the deployment of broadband infrastructure in each Member State. Given its topicality and reliance on first-hand information, a potential challenge is information scarcity and data validity. While validity issues can never be completely ruled out in a research context where information is gathered through unofficial channels as well, the authors of the present study have tried to minimize error potential and strengthen accuracy by triangulating information from different sources.

The information gathered accordingly is subsequently used to write up comprehensive reports on each Member State. To allow for comparability, each Member State section thereby follows a predefined structure. It begins with a short country profile containing information on general economic, demographic and geographic conditions. Next follows an outline of the Member States’ National Broadband Plans. In order to provide for background, each country’s NBP is contextualised – where applicable – in terms of preceding efforts, targets and/or strategies devised to promote the deployment of NGA infrastructure. After all, a country with a proven track record in promoting high speed networks in the

---

<sup>17</sup> Janet M. Box-Steffensmeier, Henry E. Brady, and David Collier (Ed.) (2008): *The Oxford Handbook of Political Methodology*: Oxford University Press.

past might on average fare better in meeting the future DAE 2020 targets than others. Not only infra-structural endowments matter in this respect, but also policy-related and administrative preparations and experiences. Accordingly, we seek to provide a holistic picture. Then an assessment of the practical implementation and broadband roll-out process is undertaken. This includes an analysis of the steering modalities (e.g. centralized vs. decentralized), the convergence of networks, sources of funding and financing, cost-reduction measures, mapping tools, and major/outstanding projects. Each country report closes with a feasibility assessment of the country's NBP, focusing on the likelihood of reaching set national targets and DAE targets as well as recommendations. In a final step, the country-based reports are examined in a cross-case analysis to identify (a) main trends and (b) best-practices across countries.

Before proceeding with the Member State reports, we shall briefly discuss definitions relevant to broadband and bandwidth and, successively, present the objectives of the EU's Digital Agenda.

## 6 Digital Agenda 2020: Towards High-Speed Internet Access in the EU

### 6.1 Definitions and Objectives

There is no standard definition for broadband. However, broadband is a term generally considered synonymous with fast connections to the internet. The EU more specifically defines broadband in terms of “high speed telecommunications systems, i.e. those capable of simultaneously supporting multiple information formats such as voice, high-speed data services and video services on demand.”<sup>18</sup>

The European Union therewith follows conventional practice of defining broadband in terms of data transmission rates (i.e. the amount of data that can be transmitted across a network connection in a given period of time). It should be noted, however, that such definitions need to take into account that bandwidth demand is dynamic. Requirements for internet applications are continuously increasing and infrastructure standards steadily improving to face growing demand.<sup>19</sup> A bandwidth-based (or data transmission speed-based) definition of broadband can therefore only be relative to a particular moment in time in a particular place.<sup>20</sup>

The Digital Agenda for Europe forms one of the seven pillars of the Europe 2020 strategy, set out to outline a path to maximise the social and economic potential of information and communication technology (ICT). The initiative underlines the importance of broadband deployment to promote social inclusion and competitiveness in the EU. It is based on the premise that services and applications are increasingly made available in an interoperable and borderless internet environment. In response, demand for higher speeds and capacity is spurred creating the business case for investments in faster networks. The deployment and take-up of faster networks in turn open the way for innovative services exploiting higher broadband speeds.<sup>21</sup>

With regard to broadband targets, the DAE in principle distinguishes three broadband categories, 2, 30, and 100 Mbps, referring to basic broadband, fast and ultra-fast broadband, respectively. Towards

---

<sup>18</sup> Cf. URL: <http://ec.europa.eu/digital-agenda/en/broadband-glossary#B>

<sup>19</sup> Cf. URL: <http://broadbandtoolkit.org/1.2>

<sup>20</sup> In addition, it should be kept in mind that internet speed is primarily an indicator measuring transfer rates of a broadband connection. Equally important, depending on the application used, may be “latency” as yet another important aspect. For instance, if a cloud service is running on a remote server, not only a high bandwidth but also the latency is of great importance (especially if access to the cloud occurs often). If each time you click it takes two or three seconds before an action is executed, user satisfaction decreases. Latency also plays a big role in telephony. If it takes too long for voice data packages to be transferred, it may become difficult to make a simple conversation work.

<sup>21</sup> See URL: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0245&from=EN>

achieving the roll-out of high-capacity networks across the EU, the Digital Agenda stipulates that Member States have to meet two major broadband targets by 2020<sup>22</sup>: on the one hand, to provide all Europeans with internet speeds higher than 30 Mbps (For further analysis, we define achievement of this target with virtually 100 % coverage, meaning 99 % and more); and on the other hand, to have 50 % or more of European households take up internet subscriptions higher than 100 Mbps.

## 6.2 Gauging Progress: Key Indicators

Broadband development can be gauged by resorting to different indicators. Indicators likely to be of most interest to policy makers are usually availability, demand, quality and pricing.<sup>23</sup> Importantly, these parameters relate to local retail access rather than to wholesale and backbone markets.<sup>24</sup> Other than that, broadband development also bears important socio-economic implications. Social effects include better access to public services and health, whereas economic effects for instance revolve around improved innovation capacity and productivity of businesses.

In particular, indicators such as fixed and mobile broadband coverage and take-up rates as well as socio-economic facets thereof (e.g. digital inclusion and provision of digital public services) deliver valuable information regarding broadband development and overall digital progress. A highly informative, in-depth analysis of such indicators in Europe is provided by the Digital Scoreboard of the European Commission<sup>25</sup>, measuring the progress of the European digital economy via the Digital Economy & Society Index (DESI)<sup>26</sup> and the European Digital Progress Report of the European Commission (EDPR)<sup>27</sup>. Hence, the aim of this section is to give a brief overview of some of the key findings of the DESI/EDPR regarding broadband development in Europe and to partially elaborate on them, in order to provide some context regarding the current status of attainment of the DAE targets, thereby creating a solid basis for the subsequent analysis of NBPs in the EU.

---

<sup>22</sup> The DAE's initial interim target for achieving basic broadband (>2mbps) by 2013 will not be part of the discussion as it has been analysed at length by the Commission Staff Working Document on the Implementation of National Broadband Plans, Brussels, 23.3.2012, SWD(2012) 68 final/2

<sup>23</sup> Additional indicators which may also be useful for monitoring and analysis include monetary-based statistics such as broadband revenues

<sup>24</sup> Cf. The World Bank (Ed.) (2012): Broadband Strategies Handbook. Tim Kelly, Rossotto Carlo Maria. Coordinated by Telecommunications Management Group, Inc., P. 77

<sup>25</sup> <https://ec.europa.eu/digital-single-market/en/digital-scoreboard>

<sup>26</sup> <https://ec.europa.eu/digital-single-market/en/desi>

<sup>27</sup> [http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc\\_id=15806](http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=15806)

## 6.2.1 Broadband Indicators: DAE targets on European and National Level

### 6.2.1.1 BASIC COVERAGE ACROSS EUROPE (DAE TARGET I)

In addition to the “grand targets” discussed further above and below, the Digital Agenda for Europe also sets to ensure full basic broadband (2 Mbps) coverage by 2013 (DAE target I). Fixed basic broadband networks are the cornerstone of this kind of connectivity in Europe and widely available, covering most of the households in the EU (97 % according to the EDPR). Moreover, mobile broadband via 3G networks has achieved a comparably high rate of coverage, with very limited differences across Member States. Additionally, satellite networks also offer ubiquitous coverage for the entire territory of the European Union. Hence, for the remainder of remote areas, where still no fixed basic broadband is available, mobile and satellite connections can constitute a pragmatic alternative. As a result, basic connectivity across Europe is given and the European Commission considers the first DAE to be achieved.

### 6.2.1.2 NGA COVERAGE (DAE TARGET II)

However, if we have a closer look at advanced *Next Generation Access* (NGA) technologies, which are able to fulfil the second DAE target of 30 Mbps downlink, the picture changes. DAE target II (100 % coverage with 30 Mbps or more until 2020) has not been achieved yet. Based on DESI data, Figure 3 shows that despite the average NGA coverage of 70.9 %, a significant number of households across Europe cannot subscribe to these higher bandwidths. The figure depicts NGA broadband coverage as a supply-side indicator calculated in terms of the percentage of population living in areas served by NGA networks. Here, NGA is understood to include FTTH and FTTB, Cable Docsis 3.0, VDSL and other superfast broadband technologies with a data download rate of at least 30 Mbps.

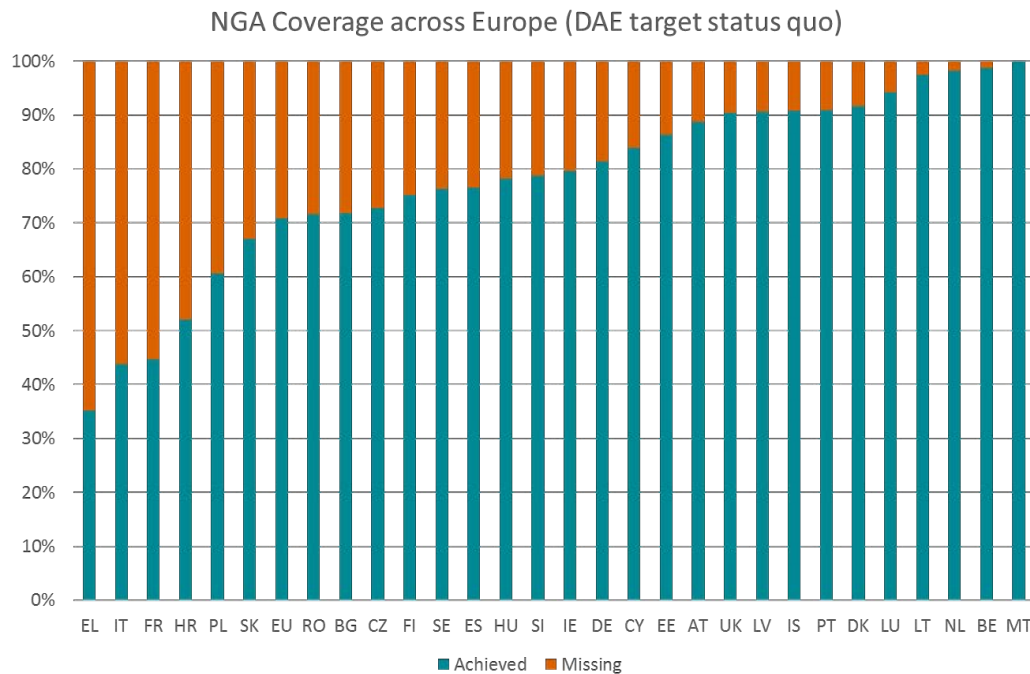


Figure 3 NGA Coverage across Europe - DAE status quo (own illustration based on DESI)

It is evident, that the only Member State with 100 % coverage for such NGA networks is Malta, followed by Belgium and the Netherlands. The other Member States differ in their degree of coverage, with France, Italy and Greece at the bottom. This current level of NGA coverage leads to the question, if and when the second DAE target will be met on a European Level. To answer this question, we have analysed the NGA coverage progress across Europe over a couple of years. Figure 4 (DESI data) depicts this evolution of digital infrastructure. From this perspective, we can see that the sequence of countries remained similar over the last five years. However, progress was generally quicker in countries with low baselines (e.g. FR, PL) compared to those with higher ones (e.g. NL, BE, MT). The question when a market saturation effect appears is especially interesting to estimate the fulfilment of targets. Analysing the existing data, we see that growth steadily declines after 90 % coverage, which means that the effort to fully cover the last few percentage points of population (mostly to be found in rural



remote areas) increases drastically while the potential turnover is relatively small, making these areas less attractive for commercial roll-out.

### NGA coverage, Member States 2011-2015

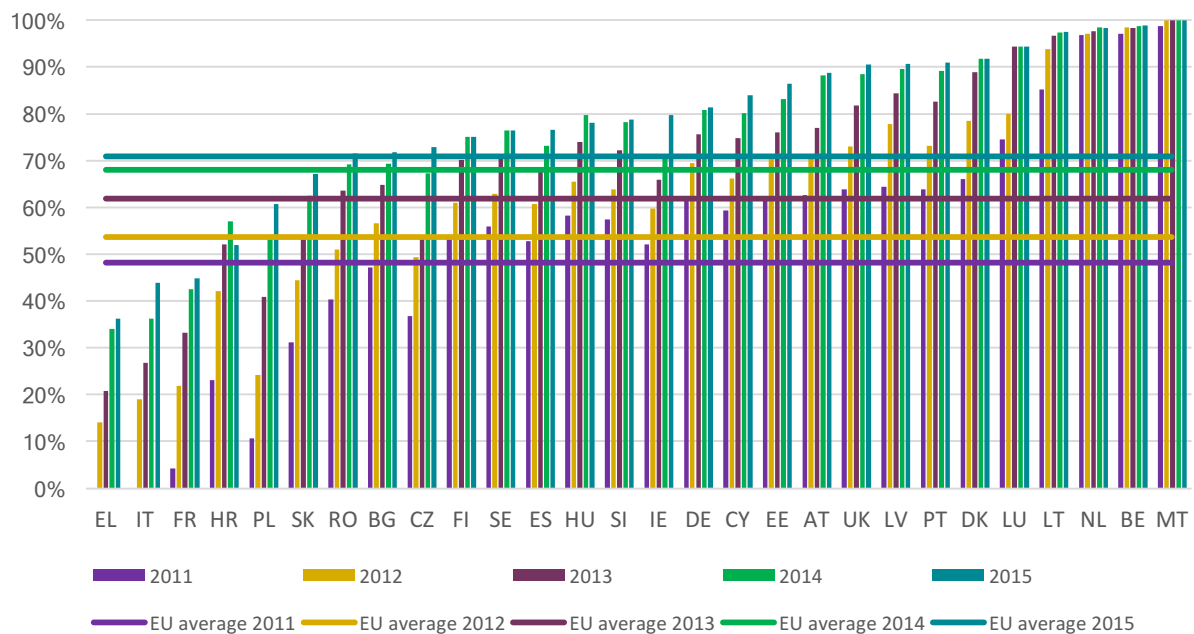


Figure 4 NGA coverage MS 2011-2015 (own illustration based on DESI)

To estimate the actual rate of progress across Europe, we have concluded several trend analyses based on current official data to determine the actual and the potential future achievement. Please note that there is a differing date of time (Mid 2015 vs End of  $n_x$ ) which distorts the trend line and leads to results that are worse than if we solely calculated with End of  $n$ . However, if we calculate a linear trend (where this distortion has the least effect;  $R^2 = 0,9841$ ), we estimate an achievement of the targets by End 2019 (see Figure 5). This is at least true on a European level. Within the country sections the achievement on national levels will be more thoroughly examined.

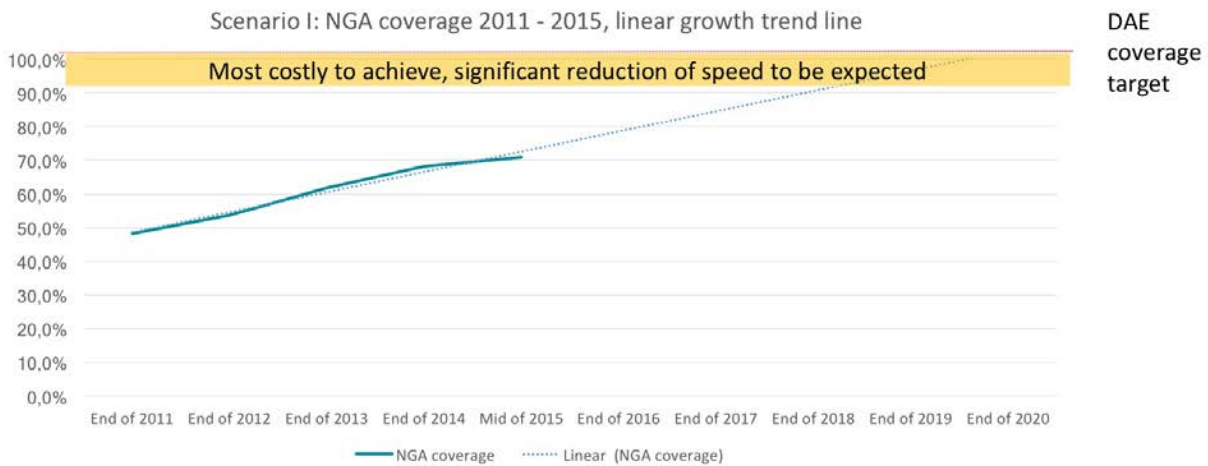


Figure 5 NGA coverage, linear growth trend (own calculation & illustration based on DESI)

To verify our first estimation, we also added exponential ( $R^2 = 0,9687$ ) and logarithmic ( $R^2 = 0,927$ ) trend lines. The exponential trend line hereby depicts a positive scenario and shows the achievement of the targets by End 2018. However, considering the market saturation effect, a further exponential growth is unlikely (see Figure 6).

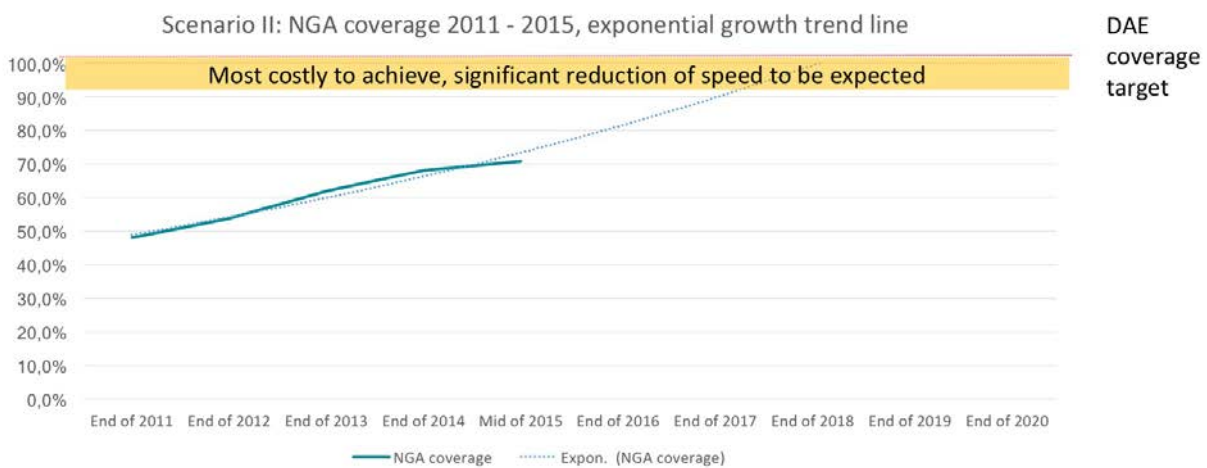


Figure 6 NGA coverage, exponential growth trend (own calculation & illustration based on DESI)

Contrarily, the logarithmic trend line representing this saturation, leads to differing results. As depicted in Figure 7, an achievement of the second target is not foreseeable. Again, it is worth noticing that the last 10 % of coverage will in any case be the costliest ones to achieve, which will lead to a severe reduction of deployment speed. We therefore conclude that an achievement of the second DAE target is rather questionable (on a European level).

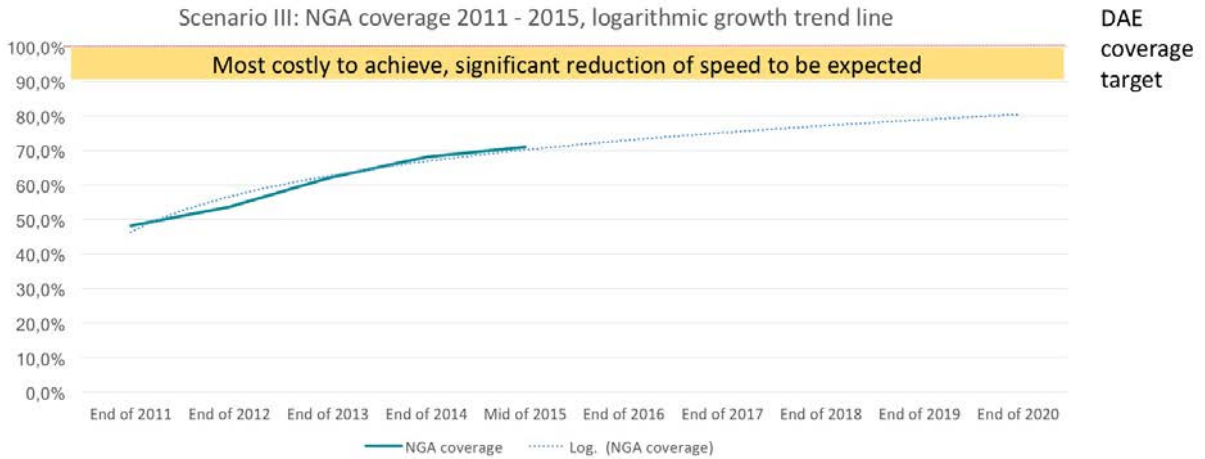


Figure 7 NGA coverage, logarithmic growth trend (own calculation & illustration based on DESI)

6.2.1.3 *ULTRAFAST SUBSCRIPTIONS (DAE TARGET III)*

Regarding the third DAE target (50 % take up for bandwidths of 100 Mbps and higher), the EDPR 2016 states that currently 8 % of European households subscribe to ultrafast connections. Looking at Figure 8 summarizing HH-penetration figures from EDPR, this still relatively low value is no surprise. In the vast majority of Member States, still less than 10 % of households subscribe to connections offering 100 Mbps or more. However, there are also several Member States with higher penetration rates, 4 of them even achieving penetration rates well above 20 %.

Percentage of households subscribing to 100 Mbps or more - 2015 (number of MS)

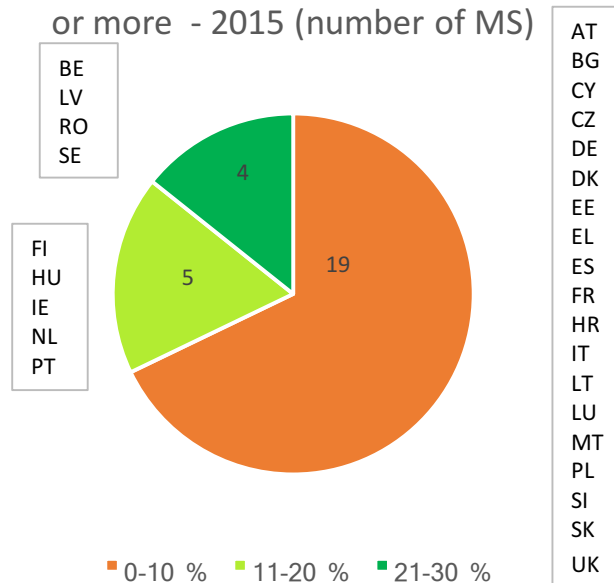


Figure 8 Subscriptions with 100 Mbps or more (percentage of HH/number of MS) (own illustration based on EDPR 2016)

Comparing take-up rates for connections  $\geq 100$  Mbps with the previously analysed NGA coverage rates reveals another interesting fact: on average, countries that tend to have a higher NGA coverage rate also tend to have higher take-up rates, suggesting that demand follows supply to some extent (based on EDPR data we calculated a correlation coefficient of 0.33). However, we can also observe that some countries deviate from this pattern (e.g. Malta having achieved full NGA coverage, but showing very low  $\geq 100$  Mbps take-up rates, whereas Romania has only an average coverage rate, but significantly outperforms most other countries regarding take-up). There are several reasons for such discrepancies: obviously technological reasons are a factor, i.e. networks capable of delivering 30 Mbps are not necessarily capable of delivering 100 Mbps, which is also confirmed by EDPR data showing that speeds of 100 Mbps or more are only available for approximately 50 % of EU households, compared to the significantly higher NGA coverage of 70.9 %. Moreover, the difference, can also be explained by demand side factors (i.e. socio-economic factors and affordability) and regional disparities, often between rural and urban areas.

In summary, one can conclude that there is currently no country that has achieved the target yet or that is close to achieving it. Hence, the current figures suggest that achieving the third DAE target remains doubtful, especially considering that, as said before, demand seems to follow supply and as there is a shortage of high-end coverage across Europe, chances are low that the take-up target can be achieved.

Although the figures and numbers indicate a clear result at first glance, there are still some dynamics that could change the current trends and make both the coverage and take-up target achievable: the increasing demand for ultrafast speeds. Based on DESI data, we calculated the recent growth rates for ultrafast subscriptions in Europe (Table 3).

MS	Growth rate	100 Mbps and above 15	100 Mbps and above 14
AT	71%	4%	2%
BE	98%	26%	13%
BG	48%	6%	4%
CY	19%	0%	0%
CZ	85%	8%	5%
DE	74%	6%	4%
DK	422%	9%	2%
EE	50%	7%	4%
EL	N.A.	0,01%	0,00%

MS	Growth rate	100 Mbps and above 15	100 Mbps and above 14
IE	-9%	17%	19%
IT	119%	1%	0%
LT	60%	17%	11%
LU	63%	9%	5%
LV	11%	42%	38%
MT	14%	1%	1%
NL	33%	18%	13%
PL	164%	8%	3%
PT	12%	25%	23%

ES	70%	14%	8%
FI	27%	23%	18%
FR	36%	8%	6%
HR	5277%	0%	0%
HU	305%	20%	5%

RO	77%	49%	28%
SE	24%	42%	34%
SI	69%	8%	4%
SK	12%	10%	9%
UK	152%	7%	3%

Table 3 Growth rates of ultra-fast subscriptions in MS 2014-2015 (own calculation & illustration based on DESI)

Nearly all of the Member States show extremely high growth rates (for EL 2014 there is no reliable data available and HR is exceptionally high, but the baseline is very low, so results are distorted). From 11 % (LV) to 422 % (DK), we can observe that the demand for ultra-high speed subscriptions across Europe is growing. This dynamic growth might make take-up targets more achievable than they currently look like. If growth stays comparably high, supply will be short of demand for these bandwidths. There might even be an overspill effect: While demand for ultrafast connections increases significantly, operators might reconsider their internal risk calculations and start deploying in areas which were deemed to be economically not viable.

If we have a closer look at the technologies deployed, we can obtain a more valid view, that supports this thesis. Figure 9, gathered from the EDPR, shows the decline of xDSL technologies while technologies that usually offer *ceteris paribus* higher bandwidths, gain market shares.

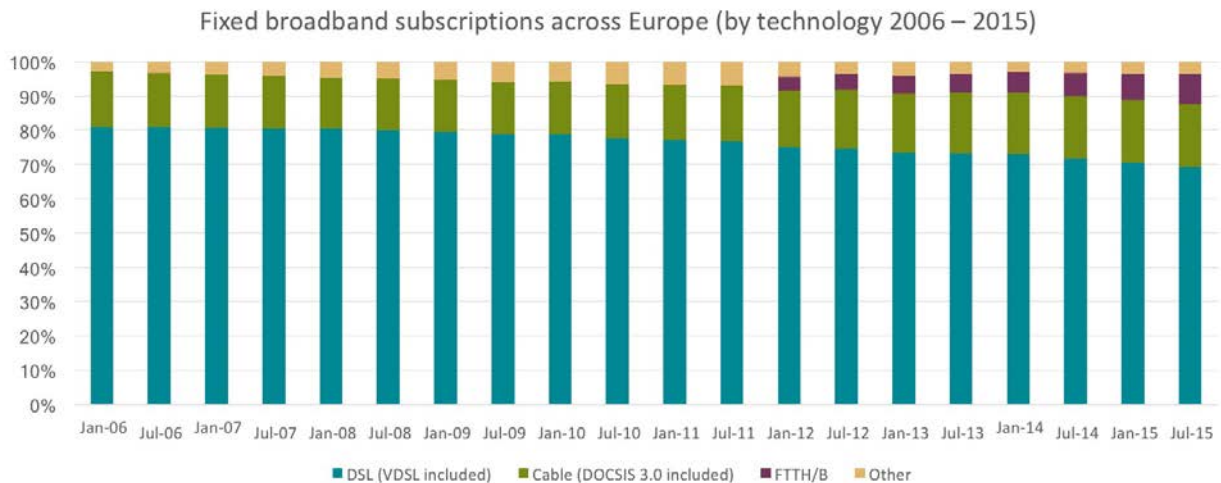


Figure 9 Development of fixed broadband subscriptions by technology (own illustration based on EDPR 2016)

Although general fixed broadband is still overwhelmingly dominated by xDSL, the picture changes when we examine only NGA subscriptions by technology. As of today, the NGA subscriptions are already dominated by non-xDSL technologies (especially cable), while FTTP is only slightly behind xDSL,

suggesting that xDSL is not fit to meet the highest standards of end-customers (see Figure 10, extracted from EDPR)

## NGA Subscriptions by technology at EU Level Mid 2015

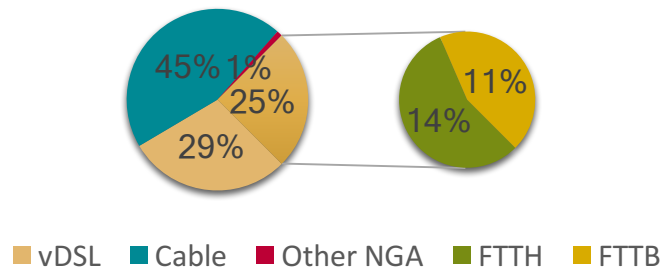


Figure 10 NGA subscriptions by technology 2015 (own illustration based on EDPR 2016)

This current displacement of xDSL technologies incentivizes the further exchange of legacy networks and deployment of future-proof technologies, which in turn makes the achievement of the DAE targets again slightly more probable.

### 6.2.1.4 MAIN CHALLENGE: RURAL AREAS

As it has been mentioned already, other factors such as demand and socio-economic factors notwithstanding, one of the key challenges regarding the achievement of both DAE targets will be the coverage of rural areas, which are still lagging significantly behind (28 % coverage according to DESI). Assuming an ongoing linear growth trend, based on DESI data, we calculated a trend line for the development of rural NGA coverage in the next years. Looking at Figure 11, it becomes clear that, based on the current trend, an overall availability of NGA networks and thus also ultrafast NGA networks (networks capable of >100 Mbps) is currently not foreseeable. Without these networks, the coverage and penetration rates cannot rise to the levels targeted. Hence, further effort with a special focus on said areas is needed to achieve the DAE targets.

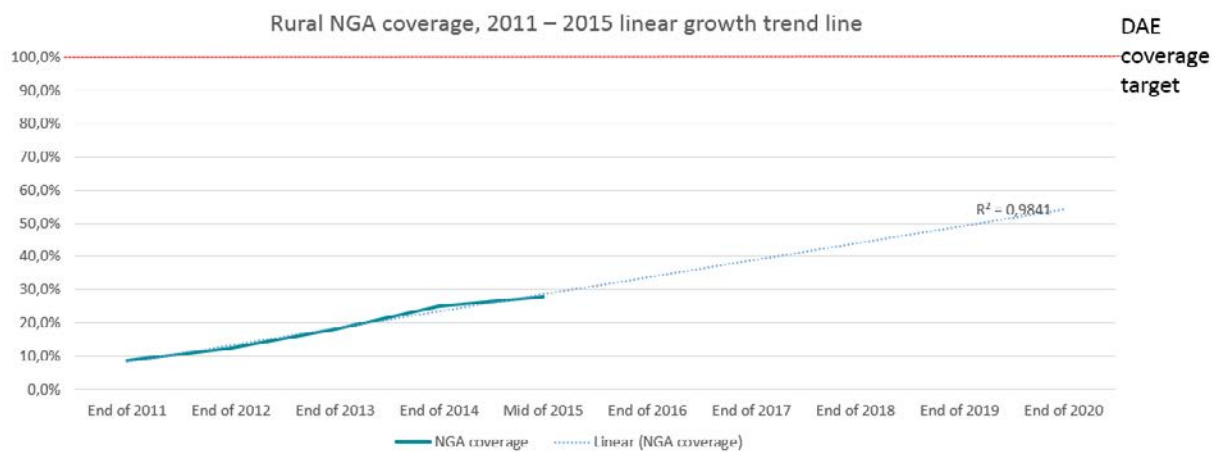


Figure 11 Rural NGA coverage, linear growth trend (own calculation & illustration based on DESI)

## 6.2.2 Socio-Economic Indicators

Besides the connectivity targets of the DAE, there are also socio-economic indicators that are valuable for assessing the status quo and possibly even the future chances of meeting the connectivity targets. Especially considering the demand side, it is useful to examine several aspects, considering the previously described impact of demand on take-up and coverage alike. These indicators express the overall digitization of a society, however, observing solely these factors do not define the whole scope of the demand side sufficiently. Especially factors such as affordability are at least equally important.

- **digital inclusion**

Digital inclusion means especially the regular internet use across the Member States, but also regular use by disadvantaged people and a low number of persons that have never used the Internet. These indicators are well suited to estimate how and if the use of internet has become a tool of everyday life. The common use of digital services directly influences the demand for broadband subscriptions, while the use by disadvantaged people and persons that have never used the internet correlates with affordability, publicly available WLAN, etc. The DAE targets here include a 70 % regular use of internet by the population, a 60 % regular use of Internet by disadvantaged people and a lower than 15 % share of people who have never used the Internet before.

- **digital public services**

The use of digital public services is another suitable set of indicators for evaluating the demand side activities of national broadband strategies. The number of people using eGovernment and the amount of returned filled forms directly show if digital services are designed well enough to substitute the

traditional administrative procedures. As traditional administrative processes are often linked to burdensome procedures (especially time and commuting), there can be a strong incentive to use digital services instead. The DAE sets its targets as 50 % of people using eGovernment services and of these, 50 percent (25 % overall) shall return filled files.

Table 4 summarizes the status quo of these indicators based on DESI data. While countries such as Denmark, Estonia, Finland and the Netherlands succeed in all indicators, Bulgaria, Cyprus, Croatia, Italy, Poland and Romania fail in all of them. This failure can be a strong indicator that the measures set for the demand side are not properly functioning and should be revised.

There are also a number of countries that succeed in some of the indicators while failing in others. Countries such as Sweden, UK, Ireland and Germany have significant success in most indicators while failing one of them. Here it is obvious, that the demand side measures are overall successful and only need minor adjustment, if at all. In these cases, evidence is not strong enough to support the call for major changes.



Summary of MS-DAE - socio-economic indicators (Annex 2 DAE)

Summary of MS-DAE - socio-economic indicators (Annex 2 DAE)					
digital inclusion			public services		
EU-28 MS	increase regular internet use	...for disadvantaged people	persons that have never used the internet	People using eGovernment	returning filled in forms
DAE	65% -> 70% / 2015	41% -> 60% / 2015	max. 15%	50%	50% of a)
AT	80,6	64	13,42	67,1	36,7
BE	83,5	72	12,64	60,6	39,2
BG	54,6	33	34,71	29,6	15,1
CY	69,6	53	26,00	46,6	23,7
CZ	77,2	66	13,36	39,1	12
DE	84,5	73	9,67	60	19,1
DK	93,2	89	2,79	91,2	71,1
EE	85,8	73	9,05	91,2	80
ES	74,7	45	19,02	62	37,7
FI	90,5	62	5,29	85,5	63,2
FR	81	84	10,77	72	48,4
EL	63	70	29,97	68,3	37,1
HR	65,8	48	26,24	49,3	21,3
HU	71,6	52	21,16	55,6	31,6
IE	77,6	63	16,47	61,1	56,5
IT	63,4	52	27,89	35,3	17,9
LT	69	50	24,56	60,4	42,3
LU	96,8	94	2,18	72,1	35,7
LV	74,9	58	18,17	65,2	36,4
MT	74,4	59	21,63	54,2	28,5
NL	91,5	87	4,44	79,4	56,1
PL	64,8	47	27,08	38,1	22,5
PT	65	51	27,86	61,8	40,8
RO	51,8	33	31,79	17,5	7,96

SE	88,6	80	4,52	79,4	48,9
SI	70,5	50	22,12	60	24,2
SK	74,2	54	16,25	62,8	16,3
UK	89,6	81	6,14	52,9	34,4

Table 4 Socio-economic indicators DAE indicators in MS 2015 (own illustration based on DESI)

### 6.2.3 Mobile network indicators

There are also other indicators that are meaningful to observe, especially mobile network indicators. Mobile networks are often a complementary and sometimes even substitute fixed networks in areas where fixed networks are extraordinary costly to deploy. Although there is a variety of non-fixed technologies (e.g. WLAN, WiMAX, Satellite, radio relay), most reliable data exists concerning the major technologies (LTE and HSPA). The following section will thus briefly show the current state of mobile broadband connectivity. The country reports will then deliver more in-depth information, if available and/or relevant.

#### MOBILE BROADBAND COVERAGE

Few mobile technologies can be considered a substitute for fixed technologies as most mobile technologies work as a shared medium and therefore divide their capabilities by the number of active users at the same time. However, some mobile technologies (e.g. LTE) have at least currently technical capabilities that let them compete with some fixed technologies in some markets. For example, in Finland, Austria, Italy and some other countries, there is a significant number of persons that uses mobile broadband only, meaning that these persons do not see an added value in fixed technologies and/or that they live in areas with no access to fixed broadband or NGA respectively. However, the technological issues mentioned above notwithstanding, even LTE coverage is by far not sufficient to substitute fixed technologies throughout Europe. According to recent DESI data, currently only 36 % of rural EU territory is covered by LTE.

There are vast differences between the Member States. As Figure 12, based on DESI data Figure 12 shows, the Member states vary between a total coverage of 100 % and roughly 45 %. The figure also shows the disparity of LTE coverage within the Member States: While some countries such as NL, SE or DK show nearly no difference between rural and total coverage, in countries such as BG and CY, there is virtually no LTE coverage in rural areas.

## LTE coverage mid 2015

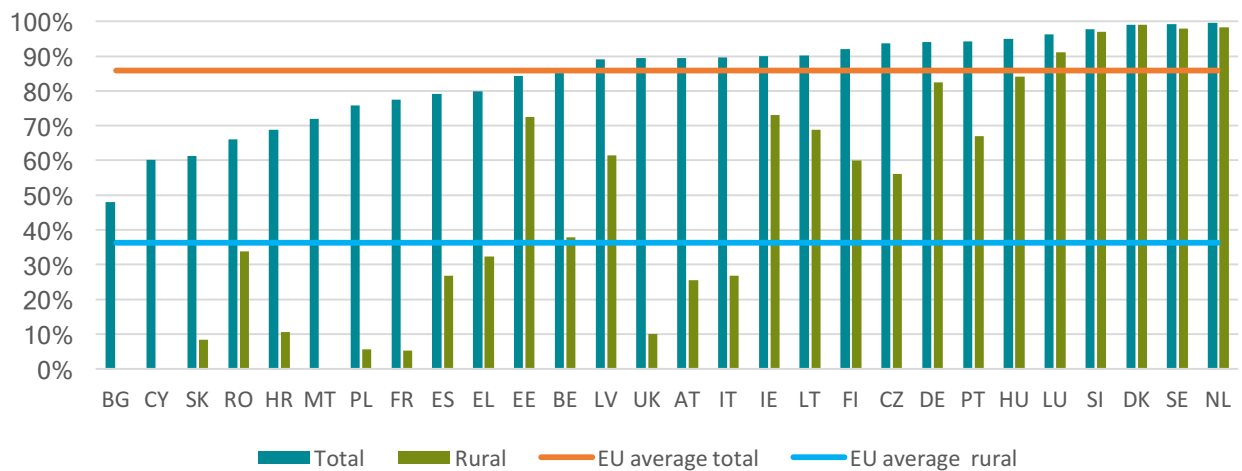


Figure 12 LTE coverage in Europe 2015 (own illustration based on DESI)

Mobile take-up, however, according to DESI data, has been constantly rising across Europe, from merely 13 % in 2008 to over 75 % in 2015. The rising number of mobile devices is the main driver of this swift development. While there are more and more devices that use SIM-cards, it is not surprising that the overall take-up rate will further increase. However, it is difficult to estimate the actual number of mobile users, as the number of SIM cards does not necessarily mean the number of persons owning a SIM-card. We often see that people have several SIM-cards (e.g. for private mobile phone, a business mobile phone, a tablet). This will be increased by future IoT tendencies. This phenomenon can be observed if we analyse mobile penetration rate on national level.

As shown in Figure 13, based on DESI data, there are several Member States with penetration rates well above 100 %, indicating the enormous importance of mobile devices.

### Mobile Broadband Penetration – all active Users

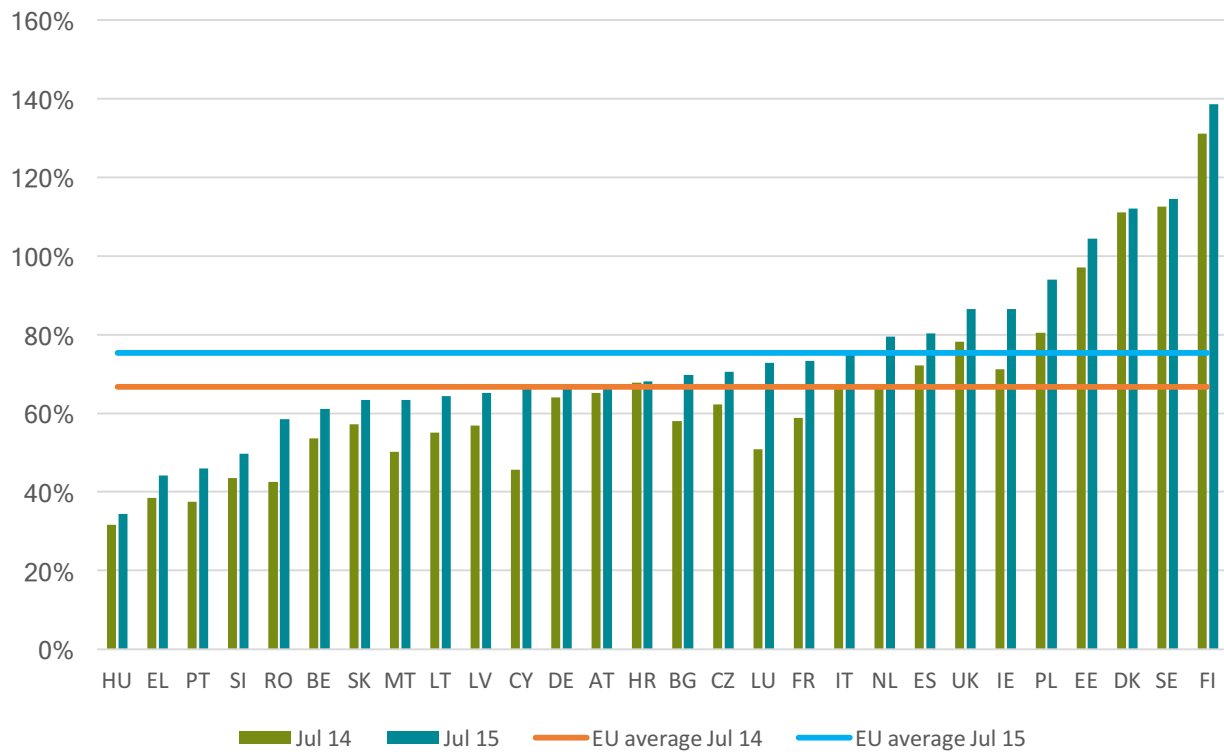


Figure 13 Mobile broadband penetration in MS - all active users (own illustration based on DESI)

## 7 Implementing the Digital Agenda 2020

### 7.1 Broadband Targets: Overview of national broadband plans

Since the adoption of the Digital Agenda for Europe (DAE) 2020 targets – i.e. coverage of 30 Mbps download for all Europeans and take-up of 100 Mbps for at least 50 % of European households - most Member States have gradually adopted National Broadband Plans (NBPs). They are devised to integrate all relevant aspects of an effective broadband policy and resources enabling policy makers and public authorities to properly plan public interventions in the telecommunications sector.

At the time of writing, a large majority of MS had already started implementing their NBPs, albeit with various time horizons ranging from 2015 to 2022. Some NBPs are integrated within broader strategic approaches, others are documents specifically dedicated to broadband deployment. In some countries, multiple official documents drafted by different national authorities exist that specify aspects related to such broadband developments. Other countries have no extensive set of written strategies or implementation plans at all.

Content-wise, nearly all Member States' NBPs focus on reaching minimum download speeds – in most cases in terms of coverage (availability of commercial offer on a given territory) and sometimes also penetration (actual take-up in the form of internet access subscriptions); in contrast, emphasis on upload data rates is rather exceptional (e.g. Denmark, Luxembourg or Ireland). Also operational measures that foster demand for digital applications and high-speed internet access are relatively infrequent.

Notably, some countries have held consultations on their draft national broadband plans. These include for instance the Czech Republic (“Digital Czech Republic”), France (“national programme for very high speed broadband”) and the Slovak Republic (“National Strategy for Broadband Access in the Slovak Republic”).<sup>28</sup>

Table 5 (below) lists the national broadband targets of the Member States in comparison with the Digital Agenda targets. The following general observations can be made:

- 11 Member States surpass the DAE-2020 targets (Austria, Belgium, Bulgaria, Denmark, Estonia, Finland, Hungary, Germany, Luxembourg, Slovenia and Sweden),

---

<sup>28</sup> OECD countries with public consultation procedures prior to drafting their national broadband plans are: Canada (“Improving Canada’s Digital Advantage”), Ireland (“Next Generation Broadband”), Japan (“Path of light”), and the United States (“Connecting America: The National Broadband Plan”).

- 14 Member States are convergent with the DAE-2020 targets (Croatia, Cyprus, Czech Republic, Greece, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Poland, Portugal, Slovakia and Spain),
- 3 Member States fall short of meeting the DAE-2020 targets (Romania, France and the United Kingdom).

MS	NBP-Targets	National vs. DAE Target II	MS	NBP-Targets	National vs. DAE Target II	National vs. DAE Target III
<b>Austria</b>	99 % coverage with 100 Mbps until 2020	++	<b>Italy</b>	100 % coverage with 30 Mbps until 2020. 85 % HH coverage to reach 50 % penetration of 100Mbps services by 2020	N.A.	=
<b>Belgium</b>	50% connections with 1 Gbps by 2020	N.A.	<b>Latvia</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020	++	=
<b>Bulgaria</b>	100 % coverage with 30 Mbps until 2020. 50 % of households and 80 % of businesses subscribing >100 Mbps by 2020	=	<b>Lithuania</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020	+	=
<b>Croatia</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020	=	<b>Luxembourg</b>	100 % coverage with 1 Gbps until 2020	=	N.A.
<b>Cyprus</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020	=	<b>Malta</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020	=	=
<b>Czech Republic</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020	=	<b>Netherlands</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020	=	=
<b>Denmark</b>	100 % coverage with 100 Mbps download and 30 Mbps upload until 2020	++	<b>Poland</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020;	N.A.	=
<b>Estonia</b>	100 % coverage with 30 Mbps until 2020. 60 % coverage with 100 Mbps until 2020	+	<b>Portugal</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020	+	=
<b>Finland</b>	99 % of all permanent residences and offices should be located within 2 km of an optic fibre network or cable network that enables connections of 100 Mbps	++	<b>Romania</b>	80 % coverage with 30 Mbps until 2020. 45 % HH penetration with 100 Mbps service until 2020	N.A.	-
<b>France</b>	100 % coverage with 30 Mbps until 2022	-	<b>Slovakia</b>	100 % coverage with 30 Mbps until 2020.	N.A.	=
<b>Greece</b>	100 % coverage with 30 Mbps until 2020. 50 % coverage with 100 Mbps until 2020	=	<b>Slovenia</b>	96 % coverage with 100 Mbps. 4% coverage 30 Mbps until 2020.	=	++
<b>Germany</b>	100 % coverage with 50 Mbps until 2018	+	<b>Spain</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020	N.A.	=

<b>Hungary</b>	100 % coverage with 30 Mbps until 2018. 50 % HH penetration with 100 Mbps service until 2020	+	=	<b>Sweden</b>	90 % coverage with 100 Mbps until 2020	++	N.A.
<b>Ireland</b>	100 % coverage with 30 Mbps until 2020. 50 % HH penetration with 100 Mbps service until 2020	=	=	<b>United Kingdom</b>	95 % coverage with superfast broadband (currently 24 Mbps) until 2017	-	N.A.

**Table 5: Comparison of National Broadband Plans' targets vs. DAE 2020 targets**

Legend: "(+)+"/"(clearly surpasses) DAE targets; "= "convergent with DAE targets, "- "does not meet DAE targets, "N.A." not defined. Some Member States do not have targets on penetration/uptake (50 % of households having 100 Mbps subscriptions or higher) in their National Broadband Plans. Source: own compilation



The following figure shows a visualization of the broadband targets of the Member States in comparison to the DAE connectivity targets.

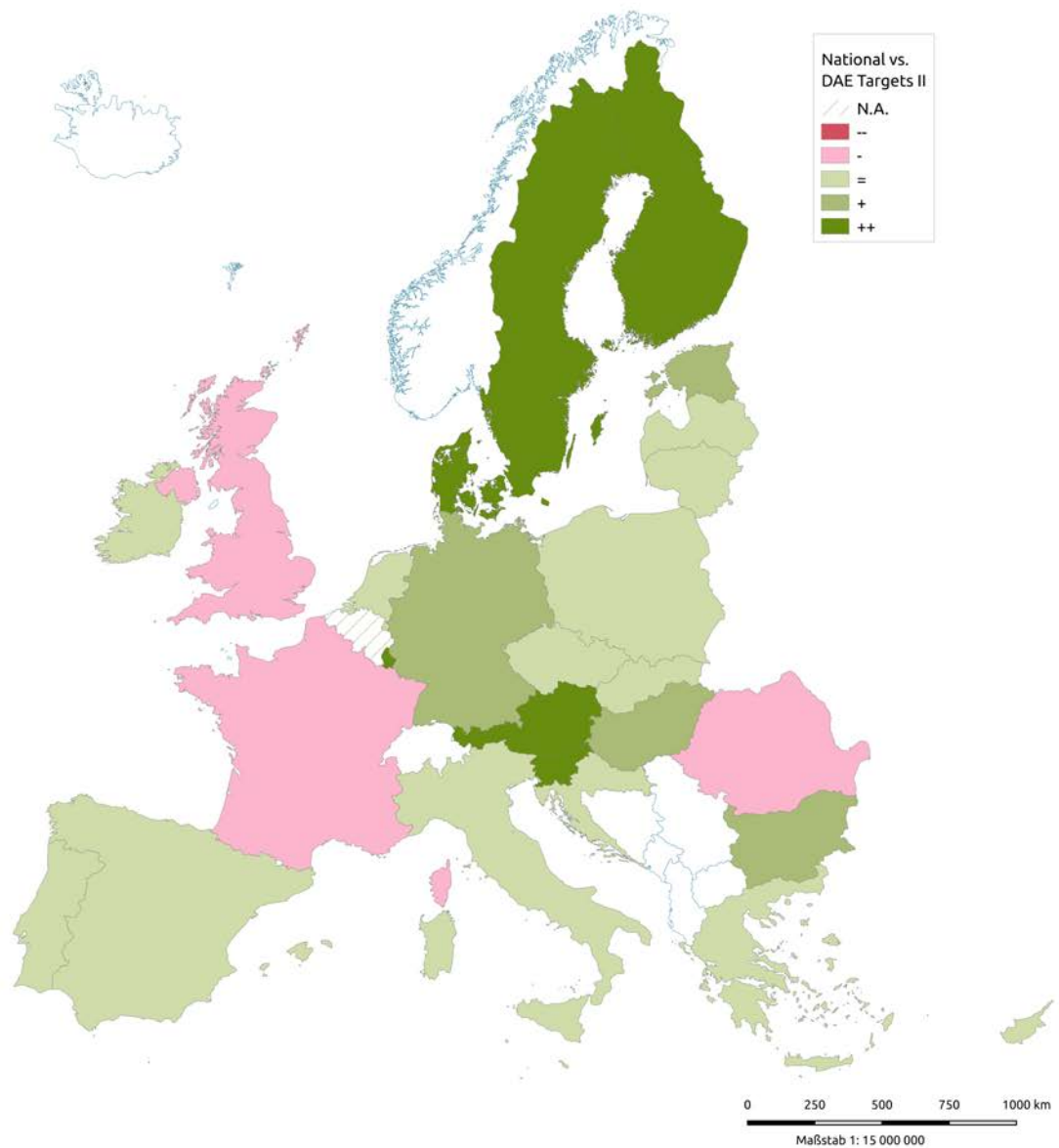


Figure 14 National vs DAE target II

In contrast, if the DAE take-up target is being visualized, it is obvious, that a lot of Member States refrain from defining take-up targets in their own broadband strategies. This however is to a certain

degree expectable as take-up is usually more difficult to incentivize than coverage. With usual means of intervention (e.g. grants for areas with market failure), take-up can only partially be influenced.

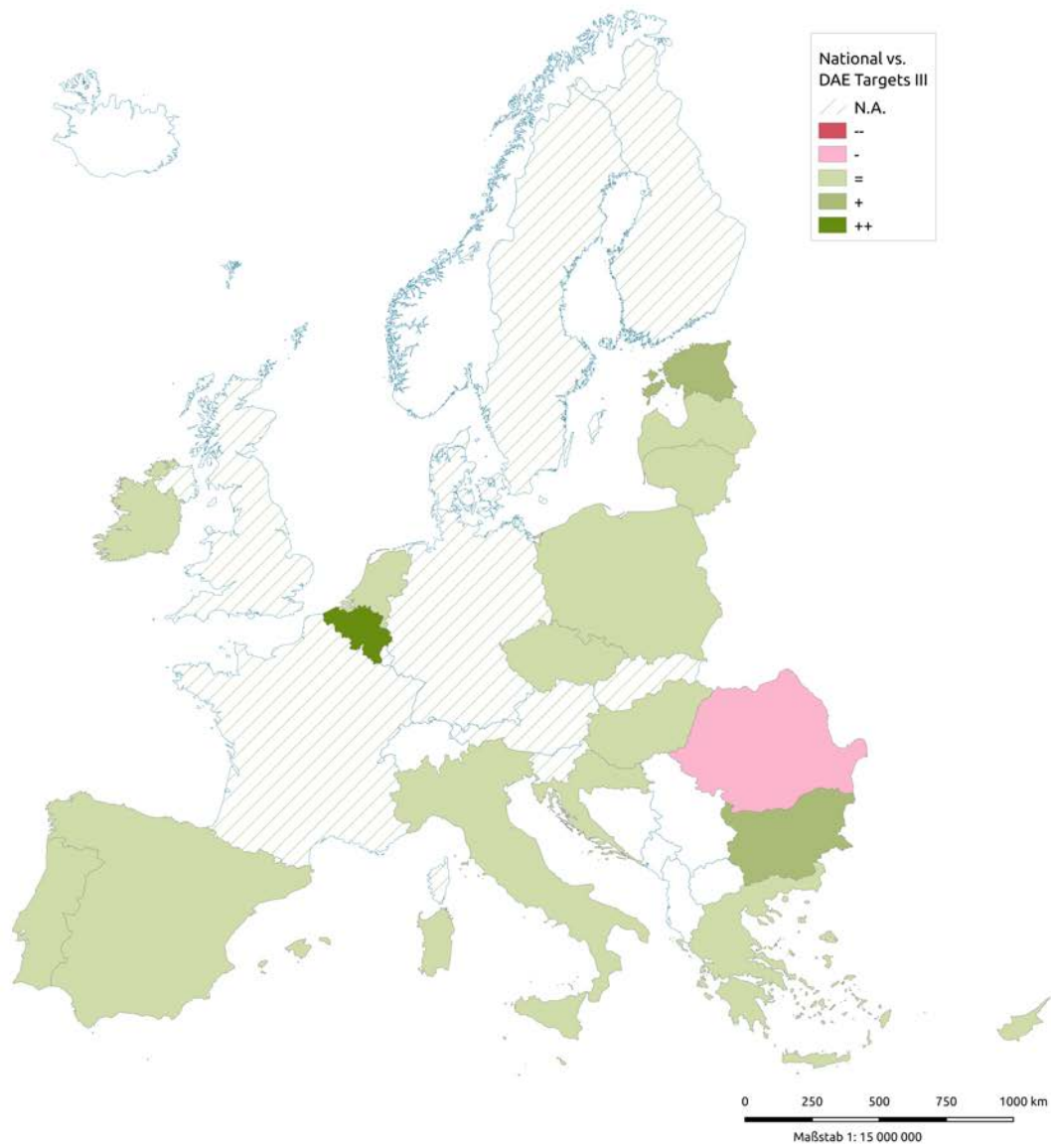


Figure 15 National vs DAE target III

### 7.1.1 NBPs: Differing Approaches

However, declared broadband targets in NBPs are, first and foremost, guideposts whose practical feasibility and actual success will depend on the utilisation of appropriate means, including legal measures and financial resources. Therefore, it is of pivotal importance that Member States have the necessary resources and tools in place, rather than merely policy targets, to facilitate the effective roll-out of broadband infrastructure on their territories.

For the actual implementation of the National Broadband Plans, the national (or regional governments in some cases) define a variety of measures. Often, the NBPs differ within two dimensions: operational and strategic NBPs. While strategic NBPs often describe intentions and targets at an abstract level, operational NBPs add indicators, responsibilities and timeframes to clarify their measures.

Mainly Strategic Elements	Mainly operational Elements
AT, BE, BG, HR, CY, CZ, DK, EE, FR, DE, LU, MT, NL, PT, SE, UK	FR, EL, HU, IE, IT, LV, LT, PL, RO, SK, SI, ES

Table 6 Strategic vs operational elements in NBP

Of course, a clear distinction between strategic and operational is usually not possible, as strategic NBPs include operational aspects and vice versa. From an evaluator’s perspective, NBPs with a strong focus on operational implementation are favourable. Especially the description of responsibilities and means of measurement are useful to find causalities and correlations. However, a majority of NBPs is characterized by strategic elements. They usually elaborate overall plans and measures without defining how they actually want to implement these measures. A full compilation of all NBP measures can be found in the annex of this study.

### 7.1.2 Probabilities of Achievement

Based on the current connectivity and take-up rates as well as the theoretical and practical implementation of the National Broadband Plans (to be examined within the following country sections), we expect the following probabilities for the EU-28 to achieve the DAE targets individually. We differentiate between low probability, medium probability, high probability and target met to classify each country. Please note that we included the most relevant mobile and fixed technologies. It is, however, well possible that, as an alternative technology, satellite connections could be available that can reliably offer 30 Mbps and more by 2020. This could at least generally validate the second DAE target.

However, satellite based technologies are currently not well accepted and represent only a niche product.

30 Mbps coverage / 100% HHs by 2020		100 Mbps take-up 50% by 2020	National target (if applicable)
EU-28 MS	Probability assessment	Probability assessment	Probability assessment
AT	medium probability	low probability	low probability
BE	high probability	high probability	medium probability <sup>29</sup>
BG	low probability	low probability	medium probability
CY	medium probability	low probability	N/A
CZ	low probability	low probability	N/A
DE	medium probability	low probability	medium probability
DK	medium probability	medium probability	low probability
EE	high probability	low probability	low probability
ES	low probability	medium probability	N/A
FI	low probability	medium probability	medium probability
FR	low probability	low probability	medium probability
EL	low probability	low probability	N/A
HR	low probability	low probability	N/A
HU	medium probability	medium probability	medium probability
IE	low probability	medium probability	N/A
IT	low probability	low probability	N/A
LT	high probability	medium probability	N/A
LU	high probability	low probability	medium probability
LV	medium probability	medium probability	N/A
MT	target met	low probability	N/A
NL	high probability	low probability	N/A
PL	low probability	low probability	N/A
PT	medium probability	medium probability	N/A
RO	medium probability	medium probability	medium probability
SE	low probability	medium probability	medium probability
SI	low probability	low probability	low probability
SK	low probability	low probability	N/A

<sup>29</sup> 80 % of businesses subscribing to 100 Mbps or more

30 Mbps coverage / 100% HHs by 2020		100 Mbps take-up 50% by 2020	National target (if applicable)
EU-28 MS	Probability assessment	Probability assessment	Probability as- sessment
UK	medium probability	low probability	medium probability

Table 7 Probability of achievement of DAE targets in MS

As shown above, regarding the DAE targets, the achievement of full NGA coverage is less problematic than 50 % household ultrafast take-up. Several countries are already close to 100 % NGA coverage and some have a high probability to eventually meet the targets (NL, LU, EE, BE). However, the majority will struggle to come close to the target. In some cases (e.g. DE, FR, PL, IT), it will be decisive, how well the national and/or European funds will be used for market initialization in areas of market failure. Concerning the take-up targets, we expect only few countries to come close to the 50 % household market penetration. We expect BG, LV, PT, RO and SE at the forefront of achieving the target or at least coming close to it.

## 7.2 Broadband Development in Practice: Member State Reports

In what follows, Member States' national broadband strategies shall be analysed on a case-by-case basis. As there are only very few countries among the EU-28 that maintain a single strategy document as point of reference, there are a variety of documents throughout Europe that were included within the upcoming chapter. Hence, the synopses presented below draw upon multiple sources. These sources, which are predominantly pertinent official documents, vary rather remarkably in content and scope. Some NBPs are very comprehensive and specific, others merely state ambitions or targets. Table 8 lists these main guiding documents we took into consideration for analysis of each and every country.

After having reviewed key features of the NBPs, the practical implementation process is examined for each Member State, taking into consideration issues such as steering modalities, convergence of networks and the role of mobile and satellite technologies, funding and financing instruments, cost-reduction measures, GIS/mapping tools, and notable roll-out projects. Often, these practical assessments are based on unofficial discussions with key stakeholders in each country and own expertise. Each Member State report closes with an evaluation, a comparison between targets and actual performance, and an assessment of the feasibility of meeting the DAE requirements.

Country	Year NBP was adopted	Title
Austria (p. 52-56)	2014	Broadband Strategy 2020 (Breitbandstrategie 2020)
Belgium (p. 57-60)	2015	Digital Belgium – Plan for Ultrafast Internet in Belgium (2015-2020) (Digital Belgium, Plan Voor Ultrafast Internet in België)
Bulgaria (p. 61-65)	2014	National Broadband Infrastructure Plan Next Generation Access Plan (2014-2020) and corresponding Roadmap
Croatia (p. 66-69)	2011	Strategy for Broadband Development in the Republic of Croatia for 2012-2015 / <i>Updated Version: Broadband development strategy 2016-2020</i>
Cyprus (p. 70-74)	2016	Cyprus Broadband Plan 2016 – 2020
Czech Republic (p. 75-79)	2013	Digital Czech Republic V.2.0 the way to the digital economy (Digitální Česko v. 2.0 Cesta k digitální ekonomice Note)
Denmark (p. 80-84)	2013	e.g. Digital Growth Policy Statement / the action plan “Better broadband and mobile coverage in Denmark” <i>Note: no single reference NBP available</i>
Estonia (p. 85-88)	2014	Digital Agenda 2020 for Estonia
Finland (p.89-93)	2008/2011	National broadband strategy/ Digital Agenda for 2011-2020
France (p. 94-98)	2015	France Very High Speed (France Très Haut Débit)
Germany (p. 99-103)	2014	Digital Agenda 2014-2017 (Digitale Agenda 2014-2017)
Greece (p. 104-108)	2015	National Plan Next Generation Broadband Access 2014-2020
Hungary (p. 109-112)	2014	National Infocommunication Strategy 2014-2020
Ireland (p. 113-117)	2012/2015	National Broadband Plan 2012 / the updated Intervention Strategy 2015
Italy (p. 118-123)	2015	Strategia italiana per la banda ultralarga (“Piano nazionale banda ultra larga”)
Latvia (p. 124-128)	2012	The conception of next generation broadband electronic communication network development 2013-2020 (Nākamās paaudzes plašjoslas elektronisko sakaru tīklu attīstības koncepcija 2013-2020 gadam)

Lithuania (p. 129-132)	2014	Plan for the Next Generation of Internet Development for 2014- 2020 in Republic of Lithuania
Luxembourg (p. 133-137)	2010	National strategy for very highspeed networks – Very highspeed broadband for all
Malta (p. 138-142)	2014	Digital Malta 2014 – 2020
Netherlands (p. 143-148)	2011/2016	Digital Agenda Netherlands (ICT voor innovatie en economische groei) / Digitale Agenda - Vernieuwen, Vertrouwen, Versnellen
Poland (p. 149-153)	2014	Polish National Broadband Plan (2014)
Portugal (p. 154-158)	2015	Agenda Portugal Digital (Diário da República, 1.ª série — N.º 74 — 16 de abril de 2015)
Romania (p. 159-164)	2015	Government Decision HG 414/2015 (Romanian Program for the implementation of the National Plan for NGN infrastructure development) and 245/2015 (National Strategy on Digital Agenda for Romania)
Slovakia (p. 165-170)	2014	Strategic document for Digital Growth and Next Generation Access Infrastructure 2014-2020 (including the new government notes)
Slovenia (p. 171-175)	2016	Plan for the development of next generation broadband networks until 2020 (updated in March 2016)
Spain (p. 176-182)	2013	The Digital Agenda for Spain - Telecommunications and Ultra-fast Networks Plan
Sweden (p. 183-187)	2009/2011	Broadband Strategy for Sweden / Swedish Digital Agenda (IT i Människans Tjänst - en digital agenda för Sverige) <i>Updated version: Sweden fully connected 2025 - A broadband strategy (Sverige helt uppkopplat 2025 - en bredbandsstrategi)</i>
United Kingdom (p. 188-194)	2015	UK Next Generation Network Infrastructure Deployment Plan (March 2015), digital communications infrastructure strategy

Table 8 NBPs in MS - main documents

## 7.2.1 Austria

### Austria facts & figures

Degree of self-governance:	Federation (federal parliamentary republic)
Population:	8,576,261 (1.69 % of EU) <sup>I</sup>
Population density:	103.6 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	83,879 km <sup>2</sup> (2.07 % of EU) <sup>III</sup>
Topography:	Largely mountainous country (Alps, only 32 % below 500 meters)
Fixed BB incumbent market share:	A1 Telekom Austria: 58 % (EU average: 41 %)
NGA coverage:	89 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	24.59 EUR <sup>30</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 9 Austria facts & figures

<sup>30</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons



### 7.2.1.1 Key Features

Austria's National Broadband Plan (NBP) "Breitbandstrategie 2020"<sup>31</sup> is generally in line with the DAE targets and surpasses them in several aspects. The Austrian government's aim is to achieve 70 % coverage of ultrafast-broadband (defined as 100 Mbps downstream) until 2018, coupled with a 99 % coverage of ultrafast-broadband for all households in Austria until 2020. In addition, Austrian officials have devised supplementary documents.

#### National Broadband Plan of Austria: key facts

Main strategic document(s):	Breitbandstrategie 2020
Targets:	<ul style="list-style-type: none"> <li>▪ 99 % coverage with 100 Mbps by 2020 / 70 % until 2018</li> </ul>
Identical to DAE-Targets:	No (more ambitious coverage target)

Table 10 NBP Austria key facts

These include a planning guide ("Planungsleitfaden Breitbandausbau"<sup>32</sup>), clarifying technical issues involved in infrastructure roll-out and a generic implementation plan ("Masterplan zur Breitbandförderung"<sup>33</sup>), specifying the funding and financing time frame and instruments (e.g. laying empty ducts in areas with market failure).

Parts of the national broadband plan are several state aid programmes ("Broadband Austria 2020 Access", "Broadband Austria 2020 Backhaul", "Broadband Austria 2020 empty ducts funding", "Broadband Austria 2020 AT:net") that shall bridge the digital divide between urban and rural areas. The funding programmes also allow for mobile technologies (e.g. LTE/5G). Austria is planning partial reinvestments of the proceeds from the digital dividend. In addition, Austria has set up a broadband competence centre in early 2013. It functions as a coordination and service centre for municipalities, cities, states and operators. Furthermore, the Austrian NBP identifies the need for an infrastructure database

<sup>31</sup> Available online (German version): <https://www.bmvit.gv.at/service/publikationen/telekommunikation/downloads/breitbandstrategie2020.pdf>

<sup>32</sup> Available online (German version): <https://www.bmvit.gv.at/service/publikationen/telekommunikation/downloads/planungsleitfaden2015.pdf>

<sup>33</sup> Available online (German version): <https://www.bmvit.gv.at/service/publikationen/telekommunikation/downloads/breitbandoffensive.pdf>

(“Baumaßnahmendatenbank”) for planned works, ideally connected with the broadband atlas and the fibre optic cadastre (“Glasfaserkataster”).

There are regional broadband plans that differ from the NBP. Upper Austria for example aims for 100 % ultrafast-broadband until 2022. Upper Austria’s own state aid programmes include special fund-

**Main Challenges for NGA-rollout in Austria:**

- Number of available ducts
- Coordination regarding In-house cabling (within spheres of influence of two ministries) might need improvement
- Emphasis on mobile networks to be a complement rather than a substitute
- Harmonization as regional targets and aspects differ
- Possibly extension of the funding programme needed to achieve the target in rural Austria
- Enhancement of Infrastructure based competition in rural areas

ing for small-scale projects and FTTH-projects.

In sum, Austria opts for a market-driven network roll-out and intends to confine the use of public funds to where they are absolutely necessary, in particular, for the rural areas with the least chance of benefiting from private sector-based investments. While the Austrian Broadband Plan is quite comprehensive, it does not specify investment needs.

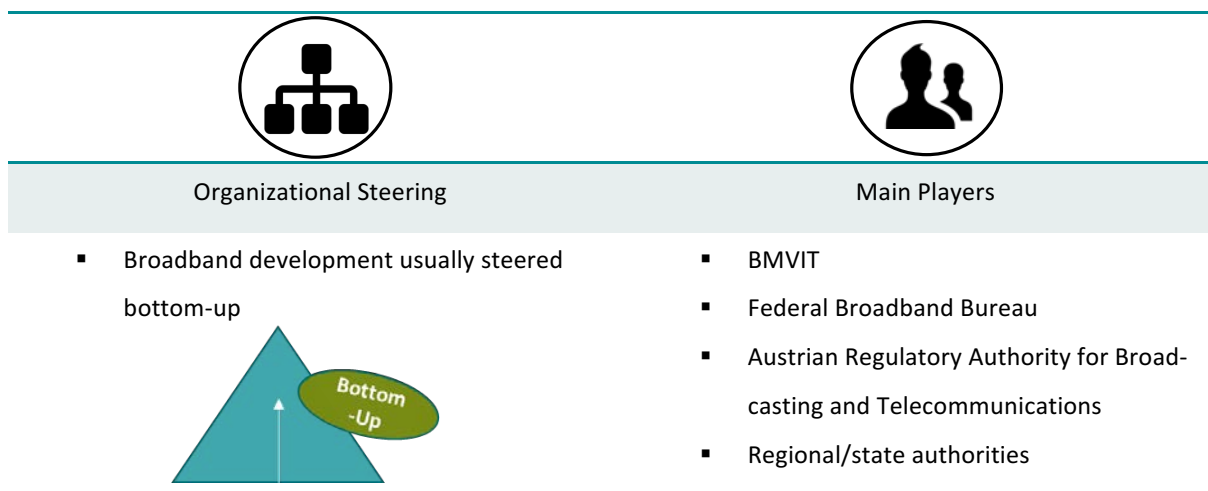


Figure 16 Organizational Steering & Main Players Austria

7.2.1.3 Feasibility Assessment

Austria’s National Broadband Plan target can be considered to be very ambitious, especially in European comparison. As a consequence, there is a **low probability** that the target of 99 % coverage with 100 Mbps downlink will be met by 2020. Concerning the DAE targets, a **medium probability to achieve the**

**coverage target** is seen as well as a **low probability to achieve the take-up target**. There are several reasons for this assessment.

Generally, Austria is performing really well concerning total NGA coverage (88.8 %). Coverage in rural areas, however, is slightly lagging behind EU average (20.8 % vs. 27.8 %). Given Austria's difficult mountainous topography and rather low population density, which considerably increases the cost of deployment, gaps regarding rural coverage are obviously to be expected. The current funding program provides important financial means for broadband roll-out, but NGA deployment in the remaining rural areas will be extremely burdensome. In this regard, further increasing the number of ducts and possibly distribution network infrastructures to promote infrastructure-based competition in rural areas will be crucial for reaching countrywide NGA coverage. Moreover, the Austrian telecommunication market is characterized by fierce price competition. Prices for NGA connections are relatively low (Austrians spend roughly 1.3 % of the median income for the subscription of the cheapest NGA tariff), which is generally positive for consumers and not necessarily a major hindrance for NGA roll-out, but also entails the risk of hampering incentives for investment. While Austria has good chances to overcome these problems regarding the DAE coverage target, reaching the much more ambitious national target will be more difficult.

Concerning take-up, we calculated that currently 2.24 % of Austrian households subscribe to connections with 100 Mbps or more. However, Austria has extremely high growth rates for ultrafast subscriptions (71 %), showing that it is still possible to reach the DAE take-up target. Nevertheless, it is currently uncertain whether this trend will persist as the current trend towards "mobile broadband only" could dampen demand for ultrafast fixed connections at some point. Moreover, if the strong demand for ultrafast connections persists, incentives for investment in ultrafast technologies such as FTTP will be crucial to ensure that this strong demand can be satisfied accordingly.

With its NBP, a funding programme worth roughly EUR 1 Billion enabling investments in access and backhaul networks as well as ducts, and a relatively high overall NGA coverage, Austria is already in a very good position regarding future broadband expansion. The public funds will play an important role in getting closer to the targets. Furthermore, there are publicly managed special purpose vehicles that deploy passive infrastructure, especially in rural areas. Some regions within Austria (e.g. Lower Austria) are bound to deploy FTTH-architectures, which is in favour of the national strategy (although at a differing timeframe, in this case 2030). In order to further increase coverage and take-up alike, especially, additional demand stimulation/aggregation and funding will be important to incentivize investments in areas where market failure can be expected. Although mobile networks are an important aspect of

connectivity in Austria and elsewhere, it should be stressed that mobile networks are more of a complement to fixed networks rather than a substitute.

The current NBP already gives a well-defined strategic focus. Hence, incorporating a somewhat more operational dimension into its NBP, thereby providing more concrete measures on how to tackle the aforementioned issues, could be beneficial to master future challenges.

## 7.2.2 Belgium

### Belgium facts & figures

Degree of self-governance:	Federation (constitutional popular monarchy and federal parliamentary democracy)
Population:	11,258,434 (2.22 % of EU) <sup>I</sup>
Population density:	370.3 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	30,528 km <sup>2</sup> (0.75 % of EU) <sup>III</sup>
Topography:	Coastal plain in the north-west, central plateau and uplands in the south (Ardennes)
Fixed BB incumbent market share:	Proximus (including Scarlet): 46 % (EU average: 41 %)
NGA coverage:	99 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	23.39 EUR <sup>34</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 11 Belgium facts & fig.

<sup>34</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons

### 7.2.2.1 Key Features

Belgium’s National Broadband Plan is part of a broader policy strategy called “Digital Belgium – Plan for Ultrafast Internet in Belgium 2015 – 2020”.<sup>35</sup> The goal is to achieve a take-up rate of 50 % of households with 1 Gbps until 2020. In this sense, the Belgian broadband targets exceed the DAE objectives.

Belgium delineated four areas of action in the plan:

- 1) common strategic vision of the roll-out of ultrafast internet,
- 2) broadband for everyone,
- 3) lower costs of building networks and
- 4) creating a dynamic ecosystem.

In the first action area (common strategic vision of the roll-out of ultrafast internet), measures include the mapping of existing network coverage, stakeholder meetings, a stable framework for network investments, and lowering the thresholds for rolling out mobile broadband. The second action area (broadband for everyone) involves the development of policy guidelines for network roll-out, mobile broadband as an alternative to fixed lines, stimulating WLAN roll-out, informing about broadband via satellite and giving priority to providing public institutions with ultrafast internet.

In the third action area (lower costs of building networks) Belgium aims at lowering costs in infrastructure roll-out projects *inter alia* by establishing a central counter for licenses, carrying out roadworks jointly, using existing infrastructure and introducing guides to in-house

### National Broadband Plan of Belgium: key facts

Main strategic document(s):	Digital Belgium – Plan for Ultrafast Internet in Belgium (2015 – 2020) (Digital Belgium, Plan Voor Ultrafast Internet in België)
Targets:	<ul style="list-style-type: none"> <li>▪ 50 % HH penetration with 1 Gbps by 2020</li> </ul>
Identical to DAE-Targets:	No (more ambitious take up target)

Table 12 NBP Belgium key facts

#### Main Challenges for NGA roll-out in Belgium:

- More diversification of technologies (FTTB/FTTH in addition to HFC) needed
- Facilitation of permit gathering procedures
- Establishing of a centrally administrated infrastructure mapping tool could prove useful
- Taxation on network deployment might need revision
- Improvement of coordination between national, regional and local level needed

<sup>35</sup> Available online (English version): <http://www.decree.be/en/plan-ultrafast-internet-belgium>

cabling (e.g. preparing for fibre optic) for new buildings or renovation plans. Action area four (dynamic ecosystem) emphasizes innovation and competition.

Belgium intends to establish a 5G framework as a complementary technology to fixed lines and as a means to foster future IoT<sup>36</sup> connectivity. There seem to be no state aid programmes for roll-out available. Neither does the Broadband Plan state needed or planned investments. Yet, the Belgian government commits to reducing administrative burdens and costs of deployment of ICT infrastructures. There are no regional broadband plans in Belgium.

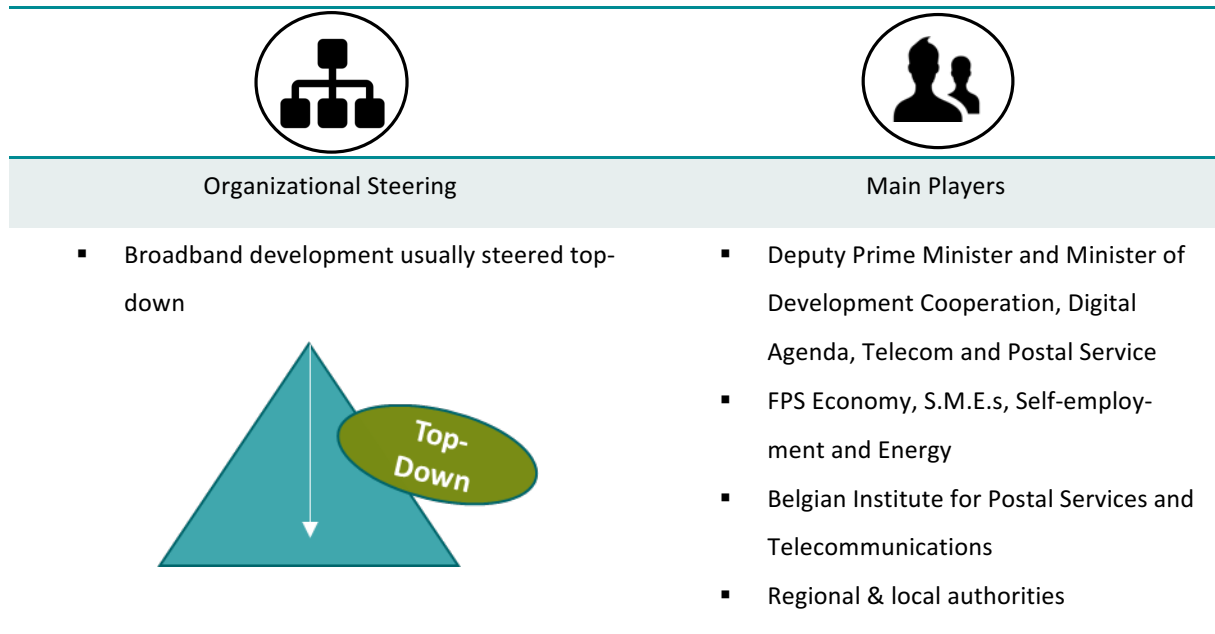


Figure 17 Organizational Steering & Main Players Belgium

### 7.2.2.2 Feasibility Assessment

Overall, despite having one of the most ambitious targets in Europe, it is certainly realistic for Belgium to reach its NBP target. Hence, it is presumed that there is a **medium probability** that Belgium will achieve its penetration target of 50 % households subscribing to 1 Gbps or more by 2020. In case of Belgium, NGA coverage is not an issue. There are widespread cable networks available that (accompanied by FTTC in urban areas) offer NGA coverage of already nearly 100 %. After an expected upgrade to the new standard DOCSIS 3.1 in the upcoming years, marketed bandwidths will be sufficient to potentially reach the target. Moreover, at the end of 2016, the incumbent telecom operator Proximus has announced an investment project to accelerate the roll-out of FTTH in the coming 10 years. However, it is at least questionable whether take-up will be high enough. Whilst Belgium already has a

<sup>36</sup> Internet of things

comparably household penetration rate of 22.7 % with 100 Mbps or more, overall fixed broadband growth rates are rather low (1.1 %), which could hamper achieving the target. Therefore, only subscribers upgrading their connections can be a potential source for achieving the target. A substantial growth for higher bandwidths is currently seen (within NGA subscriptions), but still a stronger focus on the demand side is recommended. At the same time, Belgium has to make sure that the existing networks will be upgraded.

Concerning the DAE targets, Belgium is well on the track. 100 % NGA coverage is nearly achieved (99 %), therefore a **high probability** to meet the target by 2020 is presumed. Concerning the take-up target, we conclude that Belgium also has a **high probability** to meet the target, given the current growth for ultrafast connections (nearly 100 % from 2014 to 2015).

Belgium ranks in the top group regarding broadband connectivity in Europe. The overall circumstances within the Belgian broadband market are highly in favor of a market driven NGA deployment. There are few aspects the NBP could actually improve. In its current version, the Belgian NBP follows a rather strategic approach with few concrete measures. However, it addresses the most pressing problems that should be solved. There is some room for improvement especially in the coordination of civil works, which is a competence of the regions and the municipalities. Particularly, a better developed centrally administered infrastructure mapping tool and a one-stop shop for permit granting might prove to be helpful, especially considering the fact that future competition will be between newly deployed FTTB/FTTH technologies and cable networks with a diminishing role of FTTC in the long run. However, costs of deployment will be a main factor for FTTP to be able to replace current FTTC technologies and thus to compete with the NGA-first mover cable. Therefore, any concrete measures to increase coordination, transparency concerning infrastructures or decrease costs of transaction will be crucial to facilitate the roll-out of ultra-fast networks even further.



### 7.2.3 Bulgaria

#### Bulgaria facts & figures

Degree of self-governance:	Unitary state (parliamentary democracy)
Population:	7,202,198 (1.42 % of EU) <sup>I</sup>
Population density:	66.3 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	110,370 km <sup>2</sup> (0.27 % of EU) <sup>III</sup>
Topography:	Northern lowlands (Danube plain), highlands in the south (Balkan and Rhodope Mountains)
Fixed BB incumbent market share:	Vivacom: 24 % (EU average: 41 %)
NGA coverage:	72 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	13.23 EUR <sup>37</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 13 Bulgaria facts & figures

<sup>37</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.3.1 Key Features

The Bulgarian government had launched its initial broadband strategy in November 2009. In 2014, a new broadband strategy “National Broadband Infrastructure for Next Generation Access Plan” came into force with the Decision No. 435 of the Council of Ministers (COM) from 26 June 2014.<sup>38</sup> The strategy sets broadband targets, which are in line with the DAE: 100 % coverage with 30 Mbps until 2020, and 50 % take-up rate for 100 Mbps. Furthermore, Bulgaria targets an 80 % take-up rate (100 Mbps) for businesses until 2020, which supersedes the DAE 2020 requirements. Bulgaria’s broadband plan defines six investment priority areas that reflect its broadband target structure and envisage different measures for “white”, “grey” and “black areas”.

These are:

- 1) development of existing cable access networks,
- 2) building FTTx optical cable access networks,
- 3) introduction and development of wireless NGA technologies,
- 4) development of optical and wireless broadband access connectivity with speeds exceeding 30 Mbps (“last mile”),

#### National Broadband Plan of Bulgaria: key facts

Main strategic document(s):	National Broadband Infrastructure for Next Generation Access Plan (2014 – 2020); Roadmap for the implementation of the National Broadband Infrastructure for Next Generation Access Plan
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % of households and 80 % of businesses subscribing &gt;100 Mbps by 2020</li> </ul>
Identical to DAE-Targets:	Yes (a more ambitious take up target for businesses)

Table 14 NBP Bulgaria key facts

<sup>38</sup> Available online (English Version): [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=7487](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=7487)

- 5) development of optical and wireless connectivity for ultrafast broadband access with speeds exceeding 100 Mbps to business organisations (“last mile”),
- 6) development of optical ultrafast broadband access connectivity with speeds exceeding 100 Mbps to public institutions in the country (“last mile”).

Furthermore, the Bulgarian NBP states that mobile, wireless or satellite technology may be used if these networks are able to provide next generation access services. In addition, the NBP commits to providing free access in public spaces and to co-use electronic communication infrastructures, with the objective of facilitating network-related works. In order to stimulate demand, Bulgaria *inter alia* opts for increasing the availability of digital public services.

In terms of investments, the Bulgarian NBP states that approximately BGN 234 million (ca. EUR 120 million) will be necessary to invest in “white” areas, and about BGN 54 million (ca. EUR 27.7 million) in “grey” areas. These calculations are based on a certain set of assumptions. In particular, the NBP states that settlement areas will be treated differently with respect to network deployment technique(s):

- for settlements with a population up to 100 inhabitants, connectivity will be provided through radio-relay systems that ensure speeds of up to 300 Mbps,
- for settlements with a population from 100 to 3000 people, optical infrastructures of mixed type topology (linear, star) will be established and
- for settlements with a population of over 3000 people, optical star topology infrastructures will be developed.

**Main Challenges for NGA-rollout in Bulgaria:**

- Ongoing market consolidation may bring macroeconomic advantages
- Improvement of digital literacy, skills and inclusion needed
- LTE coverage in rural areas needs improvement
- Stronger involvement of local authorities advisable
- Strong digital divide
- Increase in NGA take-up needed

The NBP quantifies the investment needs in different types of settlements; however, it does not specify the available budgetary sources. After achieving the necessary clarity regarding the available financial resources, a roadmap<sup>39</sup> stipulating the relevant national and European sources of funding for the plan to be implemented was added.

<sup>39</sup> [https://www.mtict.government.bg/upload/docs/2016-04/roadmap\\_Bulgarian\\_final\\_stages\\_10.032015.pdf](https://www.mtict.government.bg/upload/docs/2016-04/roadmap_Bulgarian_final_stages_10.032015.pdf)

European funding, especially from ERDF and EARDF, which in the past has been already used to establish a national backhaul network and to connect rural areas, constitutes one of the main sources of funding in Bulgaria. For the current funding period (2014-2020), EUR 30 million from EARDF alone were allocated exclusively to the development of ultra-fast networks. Moreover, small scale national state aid is available in cooperation with local authorities. Public-private partnerships form an integral part of the national strategy (with differing roles of the public entities).

Overall, Bulgaria’s NBP highlights the importance of private investments for achieving a countrywide roll-out of high-end ICT infrastructures. There are no regional broadband plans and municipal development plans usually do not address broadband either.

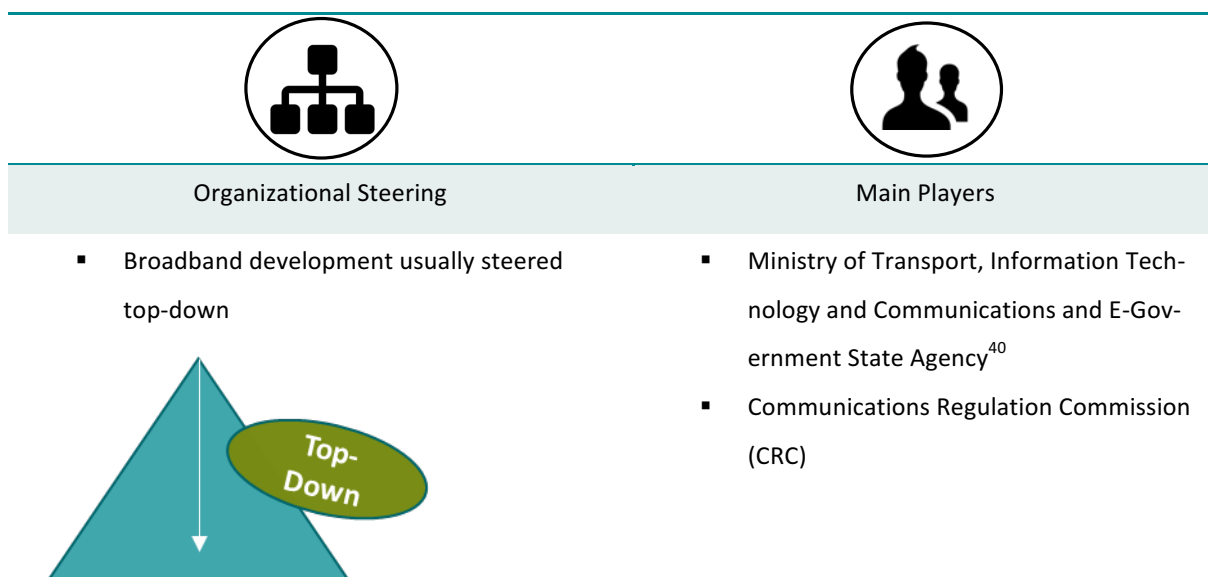


Figure 18 Organizational Steering & Main Players Bulgaria

### 7.2.3.2 Feasibility Assessment

The achievement of Bulgaria’s NBP targets will be challenging. A **medium probability** to achieve the national target of 80 % of businesses subscribing to 100 Mbps or more by 2020 is presumed. More than 72 % of enterprises already have a fixed broadband connection of which 13. 8 % are currently subscribing to 100 Mbps or more.<sup>41</sup> Considering the high growth rate of such connections (see below), reaching the national target is cumbersome, but not impossible. The other national targets are in line with the DAE targets.

<sup>40</sup> This agency was set up only very recently and will be responsible for eGovernment and broadband infrastructure-related issues. It replaces the former Executive Agency “Electronic Communication Networks and Information Society”

<sup>41</sup> [http://www.nsi.bg/sites/default/files/files/pressreleases/ICT\\_ent2016\\_en\\_RHVBRZ8.pdf](http://www.nsi.bg/sites/default/files/files/pressreleases/ICT_ent2016_en_RHVBRZ8.pdf)

Concerning the DAE coverage target, the **probability** of achievement is **low**. NGA coverage is currently roughly 71.8 % (EU average 70.9 %). The main source of this coverage is existing cable network infrastructure. Within urban areas, there is a widespread availability of such networks provided by alternative operators. The market share of alternative operators in Bulgaria even ranks among the highest in the EU, illustrating the vibrant nature of the Bulgarian market. The incumbent competes with these networks via the deployment of FTTP technologies. As a result, there is potent infrastructure based competition within urban areas and Bulgaria reaches an overall NGA coverage above EU-average. However, in rural areas, there is considerably less competition. Here, copper-based infrastructures are still dominant. Even though Bulgaria made considerable efforts, creating incentives for the deployment of new infrastructures as well as providing public funding, fully covering these areas is an extremely difficult task. Therefore, coverage is the main challenge Bulgaria will face in the next few years. The situation is further complicated by a low demand from a substantial part of the population (34 % have never used the internet). As a result, also LTE coverage is relatively low in these areas. Thus, we see a severe digital divide between urban areas, where high-end infrastructures compete and rural areas, where establishing overall fixed and mobile NGA connectivity still remains a challenge.

Concerning the DAE take-up target, the expected **probability** of achievement is rather **low**. Relatively high-end customer prices (roughly 5 % of the monthly median income is spend for the lowest NGA tariff, despite the fact that the absolute numbers are low in European comparison) are seen, which might be a hindrance for further take-up and subsequently roll-out. However, although take-up rates will probably not rise fast enough to reach the target, there are several factors providing for a generally more positive outlook. FTTP and cable dominates NGA in Bulgaria, which leads to a solid basis for high-level connectivity. Although calculated household penetration (100 Mbps) is relatively low (2.88 %), there is substantial growth concerning these ultrafast speeds (+ 48.45 % between 2014 and 2015). These arguments are even more relevant regarding the national target. Generally, businesses are more likely to take-up higher bandwidths and are usually more concentrated within urban areas, which should increase the probability of achievement, leading to a **medium probability** for the national target as mentioned above.

The current NBP acknowledges the problem of a digital divide, but prioritises the development of cable networks (which are mainly available in urban areas). However, the second priority focuses on FTTx networks in white and grey areas to address the digital divide. The NBP tries to establish PPP-models to mitigate the risk for deployment within rural areas, which were already successful in some cases. Despite the fact that Bulgaria's NBP stresses the importance of local actors, there seems to be room for improvement. Demand aggregation through inter-communal cooperation could happen on a larger

scale. Furthermore, costs of deployment should come down further, if the digital divide ought to be decreased. As a demand side measure, tax deductions exist for the use of ICT. Considering the comparably high prices for NGA access, tax deductions to incentivize a larger portion of households to take up higher bandwidths is a crucial aspect, but should be accompanied by additional measures. Generally, Bulgaria established a substantial and sound plan for broadband development, which will make a significant contribution to the country's broadband development and overall economic and social situation, especially considering the focus on a business-related target, thereby creating a solid basis upon which future measures and initiatives can be built.

## 7.2.4 Croatia

### Croatia facts & figures

Degree of self-governance:	Unitary state (parliamentary republic)
Population:	4,225,316 (0.83 % of EU) <sup>I</sup>
Population density:	74.9 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	56,694 km <sup>2</sup> (1.4 % of EU) <sup>III</sup>
Topography:	Adriatic Basin with 1,246 islands, mountain chain along the coast (Dinaric Alps), Pannonian Basin in the east
Fixed BB incumbent market share:	T-Hrvatski Telekom: 51 % (EU average: 41 %)
NGA coverage:	52 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	37.08 EUR <sup>42</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 15 Croatia facts & figures

<sup>42</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.4.1 Key Features

Croatia has formulated a “Strategy for Broadband Development in the Republic of Croatia for 2012 – 2015” published by the government in October 2011.<sup>44</sup> Croatia’s overall broadband objectives are convergent with the DAE (100 % coverage with 30 Mbps until 2020; 50 % take-up rate for 100 Mbps).

The “National Framework Programme for the Development of Broadband Infrastructure in Areas Lacking Sufficient Commercial Inter-

est for Investments” accompanies the National Broadband Plan (NBP).<sup>45</sup> The framework document establishes the procedures for state aid and public deployment of ICT infrastructures in access networks. In addition, the document outlines several possible investment models:

- Model A: private design, build, operate with public grants,
- Model B: public design, build, operate,
- Model C: public-private partnership.

In underserved areas, the Croatian NBP suggests ensuring broadband access by applying mobile communication technologies, such as UMTS, LTE and WiMAX. Concerning lowering costs, the Croatian strategy *inter alia* envisions infrastructure sharing and access to infrastructure mapping systems in the context of network roll-out projects. Besides measures for facilitating the availability of broadband access, Croatia commits to implement measures for encouraging the demand for fast networks by citizens and businesses.

<b>National Broadband Plan of Croatia: key facts</b>	
Main strategic document(s):	Strategy for Broadband Development in the Republic of Croatia for 2012 – 2015 / <i>Updated Version: Broadband development strategy 2016-2020</i> ) <sup>43</sup>
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % HH penetration with 100 Mbps service by 2020</li> </ul>
Identical to DAE-Targets:	Yes

Table 16 NBP Croatia key facts

<sup>43</sup> In 2016, the Croatian government published an updated version of the NBP this study is based on. See (Croatian version) <http://www.mppi.hr/UserDocImages/Strategija-sirokopojasni-pristup2016-2020-usvojeno%20na%20VRH.pdf>

<sup>44</sup> Available online (English Version): [http://www.mppi.hr/UserDocImages/w%20StrategyBB%205\\_12.pdf](http://www.mppi.hr/UserDocImages/w%20StrategyBB%205_12.pdf)

<sup>45</sup> [http://www.mppi.hr/UserDocImages/MPPi\\_Okvirni\\_program\\_NGA\\_BB\\_prenotification-EN\\_v4\\_17072014.pdf](http://www.mppi.hr/UserDocImages/MPPi_Okvirni_program_NGA_BB_prenotification-EN_v4_17072014.pdf)



In terms of funding, the Croatian NBP states that HRK 652.5 million (ca. EUR 83.5 million) were necessary to achieve 1,000,000 fixed broadband connections by 2013. Another HRK 900 million (EUR 120 Mio) were allocated to achieve 500,000 fibre-based broadband connections by 2015. More generally, Croatia envisages the use of EU and national funds in regions, which operators deem to be economically non-viable. 100 % aid intensity is possible. State aid intensity is the highest in rural areas if existing infrastructures can be upgraded. State aid for mobile technologies is possible as well. Currently there is a state aid programme for backhaul networks under development. In Croatia, there are no regional broadband plans available.

- Main Challenges for NGA-rollout in Croatia:
- Increase of NGA coverage and percentage of ultrafast connections needed
  - Possibly extension of national funding to achieve the targets
  - Further FTTP deployment
  - Establishing an infrastructure-mapping tool
  - Comparably high prices for NGA subscriptions

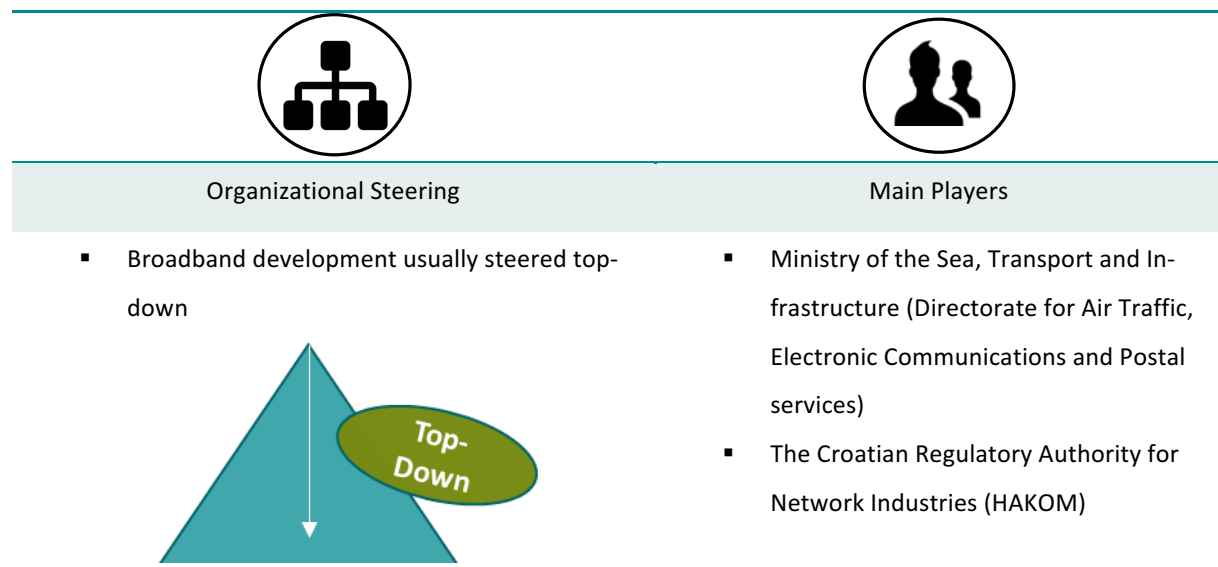


Figure 19 Organizational Steering & Main Players Croatia

#### 7.2.4.2 Feasibility Assessment

The achievement of Croatia’s NBP targets is challenging. Concerning the coverage target (100 % coverage with 30 Mbps by 2020), we estimate that despite the efforts and progress made in Croatia, there is only a **low probability** that this target can actually be met as there are several factors, some of which beyond the government’s or other actors’ sphere of influence, which make broadband roll-out in Croatia particularly difficult. The current NGA coverage in Croatia is 52 % and there is a serious digital divide. Topographic (mountainous areas) and demographic challenges alike lead to economically not feasible areas. Furthermore, several indicators (26.24 % of “non-liners”, only 65.8 % of the population

uses the internet on a regular basis) show that demand is not strong enough and hereby creates uncertainty concerning new investments in NGA networks. Hence, also wireless solutions are not able to constitute an appropriate alternative to fixed NGA networks in many areas.

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), we also conclude that there is a **low probability** that Croatia will meet the target. We calculated that currently 0.12 % of households fulfil this criterion. On the plus side, there is a massive growth of subscriptions with 100 Mbps or more (5,277 % from 2014 to 2015), but one has to observe the low baseline (in 2014 100 Mbps and more had a market share of slightly more than 0.00 %, while in 2015 the market share was 0.19 %). Therefore, it is difficult to draw meaningful conclusions from the current growth rate and even if this trend continues, it will probably be difficult for supply to keep up with demand in short future. However, as said before, demand in general is an issue that inhibits higher take-up rates. One obvious factor that negatively impacts the demand side is affordability. In Croatia, NGA subscriptions consume roughly 9 % of the median income - the highest value in the EU (EU average 3 %).

Until 2010, Croatia's incumbent deployed FTTH GPON networks but then switched to VDSL deployment. As a result, only few FTTP connections exist and xDSL technologies are still dominant in Croatia. However, cable operators became the main source of NGA connectivity during the last couple of years, forcing the incumbent to invest in FTTP and fibre based VDSL again in order to compete with DOCSIS providers.

Croatia's NBP has been updated in 2016. The previous NBP (2012 – 2015) was rather strategic than operational, outlining general statements on the importance of broadband. Measures, responsibilities and monitoring tools were rather vague regarding some fields of intervention. However, the NBP had a rather extensive section on the demand side, describing the advantages of broadband for end customers and activities to foster them (e.g. e-Government, involvement of stakeholders). In this regard, the lack of demand for NGA services had been identified as one of the issues in Croatia.

Whilst the 2012 – 2015 version of the NBP laid the foundation by providing clear strategic guidance, the recently adopted updated version can be considered to be much more operational and therefore has great potential to tackle the biggest challenges of affordability and availability. The current version has a stronger focus on the supply side and also contains an action plan. Hence, it is much more specific regarding the definition of concrete measures, responsibilities and monitoring mechanisms. Actions include the establishment of a central infrastructure cadastre and measures to decrease the cost of deployment. In this regard, the transposition of the cost reduction directive, which has been realized at the end of 2016, plays a crucial role. Moreover, stronger support for regional/local self-government

units in the launching and preparation of broadband projects is foreseen, which could foster necessary demand aggregation. The total budget for the implementation of measures included in the strategy amounts up to EUR 765 million. Hence, despite probably missing the DAE targets, Croatia has identified its main challenges and thus seems to be prepared for the future developments.

## 7.2.5 Cyprus

### Cyprus facts & figures

Degree of self-governance:	Unitary state (presidential republic)
Population:	847,008 (0.17 % of EU) <sup>I</sup>
Population density:	92.5 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	9,251 km <sup>2</sup> (0.23 % of EU) <sup>III</sup>
Topography:	Mountain ranges in the south-west (Troodos Mountains) and north (Kyrenia Mountains), central plain (Mesaoria)
Fixed BB incumbent market share:	CYTA (Cyprus Telecommunications Authority): 63 % (EU average: 41 %)
NGA coverage:	84 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	69.37 EUR <sup>46</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

[Table 17 Cyprus facts & figures](#)

<sup>46</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.5.1 Key Features

The National Broadband Plan (NBP) of Cyprus “Digital Strategy for Cyprus” was initiated by the Ministry of Communications and Works, Department of Electronic Communications in 2012.<sup>47</sup> Cyprus’ broadband targets are in line with the DAE (100 % coverage with 30 Mbps until 2020 and 50 % take-up rate for 100 Mbps). Cyprus’ NBP is divided into 6 objectives. The first objective, “Connect Cyprus”, includes five measures:

- 1) to promote a stable regulatory framework,
- 2) licensing of wireless networks (e.g. avoidance of spectrum hoarding),
- 3) promote competition and decrease of broadband prices,
- 4) establish fibre to the home networks (FTTH) and
- 5) strengthen network and information security.

Besides the development of future-proof network infrastructure, the Cyprus strategy envisages to foster the digitisation of public services. Furthermore, an increase of digital literacy is planned as well as to promote the digital economy and to make use of ICT for the overall livelihood. The Cypriot strategy also aims at installing public computers as well as free WLAN access with fast internet connections in public places.

Overall, these measures are centred on the development of a regulatory framework that is in favour of FTTH infrastructures. Generally speaking, Cyprus follows a market-based approach to achieve its

### National Broadband Plan of Cyprus:

#### key facts

Main strategic document(s):	Digital Strategy for Cyprus by 2012 Cyprus Broadband Plan 2016 – 2020
-----------------------------	--

Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % households penetration with 100 Mbps service by 2020</li> </ul>
----------	--

Identical to DAE-Targets:	Yes
---------------------------	-----

Table 18 NBP Cyprus key facts

<sup>47</sup> Available online (English Version): [http://ec.europa.eu/information\\_society/newsroom/cf/dae/document.cfm?doc\\_id=4831](http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=4831)

targets. Funding for underserved areas is available from EU funds and public sources solely if market-driven deployment fails.

Cyprus has prepared a new Broadband Plan for the period of 2016 – 2020.<sup>48</sup> In preparation of the plan, a public consultation started on 29 January 2016, lasting until 26 February 2016.<sup>49</sup> The new broadband plan follows the activities of the previous NBP with a focus on further development of supply and demand side. Similar to the previous version, the new NBP considers the combination of public and private investment as essential

**Main Challenges for NGA-rollout in Cyprus:**

- High incumbent market share
- Comparably high price level
- Enhanced regulatory measures might be needed
- More transparency regarding infrastructure advisable (no mapping tool available yet)
- Increase of digital awareness and digital skills needed

components and addresses that EUR 22 Million is secured from the European Structural and Investment Funds (ESIF) for broadband development. This will be accompanied by a plan to secure other financial support in the form of guarantees, project bonds, loans and grants.

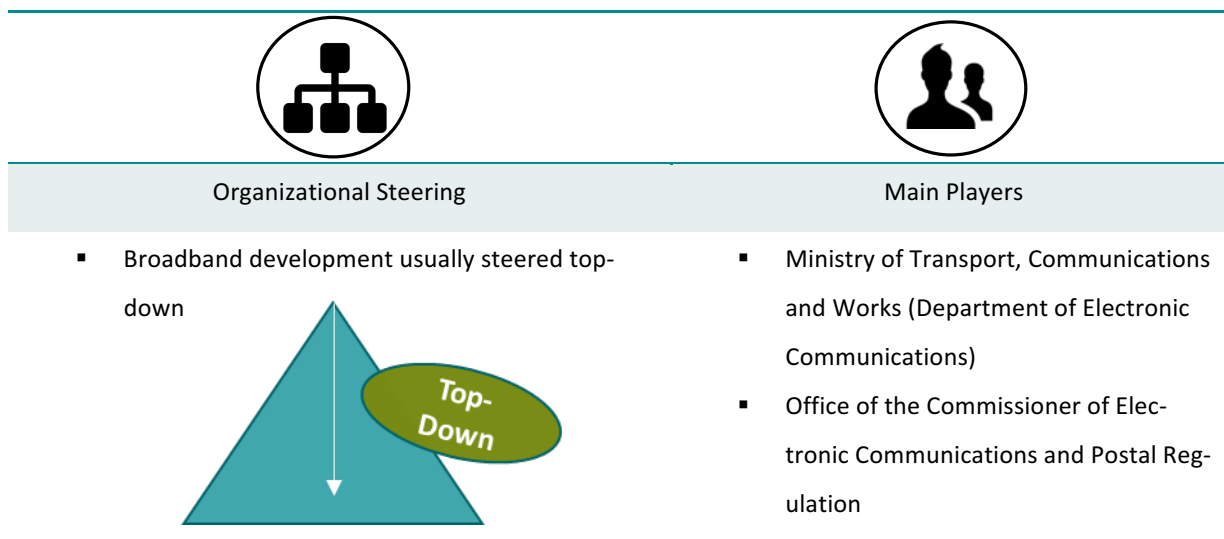


Figure 20 Organizational Steering & Main Players Cyprus

### 7.2.5.2 Feasibility Assessment

The achievement of Cyprus’ National Broadband Plan targets can be regarded as major challenge for the country. While the current NGA coverage is relatively high (86 %) and well above EU average (70.9

<sup>48</sup> [http://www.mcw.gov.cy/mcw/dec/dec.nsf/All/AA8BA9C426E54929C2257FBE0023CF39/\\$file/Cyprus\\_Broadband\\_Plan.pdf?OpenElement](http://www.mcw.gov.cy/mcw/dec/dec.nsf/All/AA8BA9C426E54929C2257FBE0023CF39/$file/Cyprus_Broadband_Plan.pdf?OpenElement)

<sup>49</sup> [http://www.mcw.gov.cy/mcw/dec/dec.nsf/DMLhearings\\_gr/DMLhearings\\_gr?Opendocument](http://www.mcw.gov.cy/mcw/dec/dec.nsf/DMLhearings_gr/DMLhearings_gr?Opendocument)

%), we expect a slowdown for the remaining 14 % of the population due to topographical circumstances, non-widely available cable networks and few incentives for operators to invest in currently uneconomical areas. Nonetheless, despite probably missing the target of full NGA coverage, we also assume that only a minority of the population will not be able to subscribe to a marketed speed of more than 30 Mbps in 2020, meaning that substantial progress is expected. Hence, despite the fact that a continuation of the overall positive development can be expected, there is a **low-medium probability** of fully achieving DAE target II.

Concerning penetration rates, to achieve actual connection speeds of >30Mbps via ADSL2+ (providers currently market speeds of 40 Mbps to 51 Mbps), technologies such as vectoring, pair bonding or phantom mode must be applied, which need substantial investments in legacy networks. Thus, this fact is exacerbating the main existing challenge for higher take-up rates by end-customers: affordability. Contrarily, mobile broadband prices are getting more affordable and 4G/H+ coverage is expanding. With Mobile networks (4G), fixed VDSL connections and few DOCSIS 3.0 cable networks (the technologies existing in Cyprus that can theoretically achieve  $\geq 100$  Mbps), there is a **low probability** for Cyprus to meet the target of 50 % take-up of 100 Mbps broadband connections by 2020. We have calculated that currently 0.06 % of households fulfil this criterion, making an achievement of the target difficult, even if growth rates were high.

As price levels are already comparably high, the willingness to pay a premium for higher bandwidths on the part of end customers is rather limited. However, current measures such as tax deductions are already a step in the right direction to substantially increase take-up rates. In combination with further public investment to incentivize upgrades of existing networks or even the deployment of technologies with higher capabilities than the existing xDSL solutions, take-up rates might gain momentum in the future.

At any rate, increasing digital awareness and interest in broadband remains a major challenge for Cyprus as socio-economic indicators show that a substantial part of the population cannot or does not want to use digital services yet. Free WLAN in public institutions is a step in the right direction in order to narrow the digital divide. In addition, transparency concerning existing infrastructures and regulatory measures to increase competition between operators would help to decrease prices. Therefore, the planned development of an infrastructure-mapping tool is an approach deemed adequate.

The current NBP addresses these issues, providing overall strategic guidance and thus contributing to the generally positive development in recent years. Cyprus' upcoming NBP could, however, define more concrete measures including defined responsibilities, indicators and time frames on how to

tackle these issues in detail, potentially via the use of financial instruments, funding and better use of existing and upcoming infrastructures.



## 7.2.6 Czech Republic

### Czech Republic facts & figures

Degree of self-governance:	Unitary state (parliamentary representative Republic)
Population:	10,538,275 (2.07 % of EU) <sup>I</sup>
Population density:	136.3 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	78,868 km <sup>2</sup> (1.94 % of EU) <sup>III</sup>
Topography:	Two mountainous regions, Bohemia in the west, Moravia in the east, river basin in Bohemia (Elbe and Vltava rivers)
Fixed BB incumbent market share:	Telefonica O2 Czech Republic: 28 % (EU average: 41 %)
NGA coverage:	73 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	15.18 EUR <sup>50</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 19 Czech Republic facts & figures

<sup>50</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.6.1 Key Features

The Czech Republic has put up a broadband strategy entitled “Digitální Česko v. 2.0 Cesta k digitální ekonomice” aiming at implementing the EU’s Digital Agenda.<sup>51</sup> The national strategy commits to providing broadband access with at least 30 Mbps for all households and 100 Mbps for 50 % of households and enterprises by 2020. These targets are in line with the DAE. Besides supply-side interventions, the Czech NBP also promotes measures to support demand for high-speed internet access.

<b>National Broadband Plan of Czech Republic: key facts</b>	
Main strategic document(s):	Digitální Česko v. 2.0 Cesta k digitální ekonomice Note: A new NBP (NPRSNG) has been adopted shortly before this study was completed
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % household penetration with 100 Mbps service by 2020</li> </ul>
Identical to DAE-Targets:	Yes

Table 20 NBP Czech Republic key facts

Other action areas include the establishment of a register of passive infrastructures (mapping), the allocation of radio frequencies for mobile networks (especially with regards to expanding coverage in rural areas), transition to the IPv6 protocol and the launch of an information portal ([www.digitalnicesko.cz](http://www.digitalnicesko.cz)). In terms of funding, the Czech NBP stresses the effective utilisation of EU funds. Stimulating the development of market-based competition in network roll-out is also a stated aim of the Czech Government.

<sup>51</sup> Available online (Czech Version): [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4833](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4833)

A new strategy entitled “Národní plan rozvoje sítí nové generace” (NPRSNG - English: National Plan for the Development of Next Generation Networks) has been adopted shortly before this study was completed.<sup>52</sup> The Ministry of Industry and Trade and the Ministry of Interior<sup>53</sup> have prepared separate draft documents. However, the latter was reportedly held to withdraw from the process for different reasons. The new NBP also includes up-to-date information from an ongoing collection of geographic data (white spots mapping). Furthermore, the new strategy contains an action plan, a timetable and specific tasks for government authorities.

A funding programme with total subsidies of about CZK

14 billion (approx. EUR 517 million) to support NGA roll-out is in preparation. This initiative represents the operational programme for gaining financial resources from the European Structural Investment Funds (ESIF). The main beneficiaries of the programme are telecommunications providers. The financing instrument allocates subsidies for about 50 % of the costs involved in deploying the passive part of the NGA and backhaul networks (typically optical cabling, splitters, cabinets and their installations). Support from EU and public funds can only be directed to white areas.

Main Challenges for NGA roll-out in Czech Republic:

- Infrastructure and service mapping need improvement
- Very high percentage of fixed wireless access-only users
- Very fragmented WLAN market
- Harmonization of outside plant building standards might bear cost advantages
- Smooth shift of responsibilities needed
- Some delays in the start of ESIF measures because of differing approaches (national broadband company vs. competitive selection process)

---

<sup>52</sup> Available online (English Version): [http://www.mpo.cz/assets/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepcie-a-strategie/narodni-plan-rozvoje-siti-nga/2016/11/NPRSNG\\_EN\\_final-copy\\_1.pdf](http://www.mpo.cz/assets/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepcie-a-strategie/narodni-plan-rozvoje-siti-nga/2016/11/NPRSNG_EN_final-copy_1.pdf)

<sup>53</sup> Available online (Czech version): <http://www.mvcr.cz/clanek/ruzne-poskytnuti-informace-dokumentu-narodni-plan-rozvoje-siti-nove-generace-strategie-skokove-zmeny-2030.aspx>

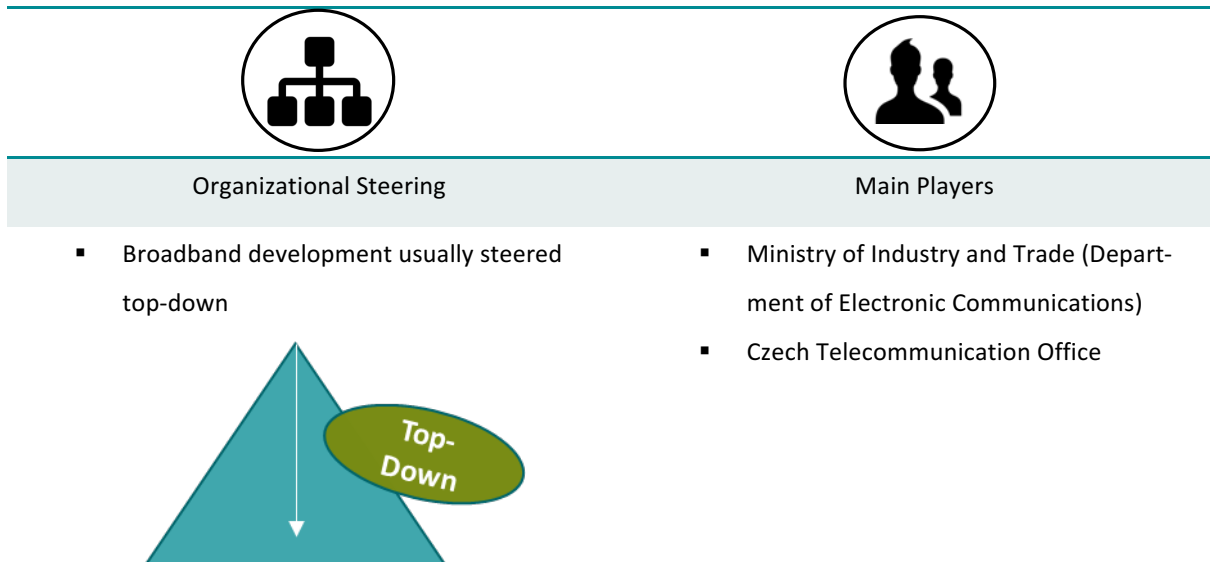


Figure 21 Organizational Steering & Main Players Czech Republic

#### 7.2.6.2 Feasibility Assessment

Large efforts will be necessary for the Czech Republic to reach its coverage and take-up targets. Hence, a **low probability** for the achievement of both targets is assumed. NGA coverage is currently at 72.9 %, which is relatively high and above EU average. However, there is still a substantial portion of the population without access to NGA technologies, making it rather difficult to achieve full coverage until 2020. Take-up is also relatively low, we calculated a 5.55 % household penetration rate (with subscriptions of 100 Mbps or more). On the plus side, demand for ultra-fast bandwidths grows considerably, but overall growth rates for broadband connections are relatively low (1.1 %). The purchasing power in the Czech Republic is below EU average and customers are very price-sensitive, which is one of the reasons for the considerable expansion of low-priced internet access via the WLAN networks in unlicensed bands. Therefore, consumer prices for internet access are lower.

Currently, an option to achieve the targets is a quick upgrade of existing cable networks. This would increase chances to meet the take-up target considerably and might even have a minor effect on getting closer to the coverage target.

This approach is also in line with the current NBP. The Czech Republic has prioritized the upgrade of their existing cable and VDSL networks in urban areas. WLAN-solutions are to be used for connectivity in less densely populated areas. WLAN providers compete in these areas with ADSL und deliver comparably good quality of services. However, the upgrade of existing infrastructures and competition between less capable technologies leads to very few projects to deploy FTTB/FTTH.

The Czech Republic's NBP is relatively operational (17 measures are defined and to be monitored annually) and addresses a lot of topics that are relevant for the Czech context (e.g. digital inclusion, funding, transparency, digital divide, co-investments, spectrum auctions). A future challenge lies in fostering consolidation within the WLAN market, allowing for economies of scale and quicker upgrades. However, WLAN should in the long run be regarded as a complementary and not as a substitute for fixed networks. Demand aggregation should be fostered and further funding should be used to initialize markets in areas of market failure, which is particularly the case in many rural areas. In this regard, close cooperation with local and regional actors will be needed. Promoting high-end technologies could pressure the market to quickly upgrade existing infrastructures, leading to high-end infrastructure based competition at some point. The only very recently adopted new NBP already largely takes these issues into account. Especially the new funding programme aiming at the development of backhaul and access networks is expected to have a positive effect of broadband development in the Czech Republic.

## 7.2.7 Denmark

### Denmark facts & figures

Degree of self-governance:	Unitary state (constitutional monarchy with a representative parliamentary system)
Population:	5,659,715 (1.11 % of EU) <sup>I</sup>
Population density:	131.5 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	42,924 km <sup>2</sup> (1.06 % of EU) <sup>III</sup>
Topography:	Peninsula of Jutland with rolling plains and dunes in the north as well as 442 named islands (74 inhabited)
Fixed BB incumbent market share:	TDC: 57 % (EU average: 41 %)
NGA coverage:	92 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	25.81 EUR <sup>54</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 21 Denmark facts & figures

<sup>54</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.7.1 Key Features

In 2010, the Danish government has announced the ambition that every household and business should have access to at least 100 Mbps download. Furthermore, in 2013, Denmark introduced the action plan “better broadband and mobile coverage in Denmark”<sup>55</sup> with 22 initiatives to promote broadband and mobile coverage in all parts of the country, especially in rural areas. Therein, an upload goal was added stating that everyone should also have access to at least 30 Mbps upload speeds.

#### National Broadband Plan of Denmark: key facts

Main strategic document(s):	Digital Growth Policy Statement (no single reference NBP available, multiple documents e.g. the action plan “Better broadband and mobile coverage in Denmark”)
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 100 Mbps download and 30 Mbps upload by 2020</li> </ul>
Identical to DAE-Targets:	No (more ambitious coverage target)

Table 22 Denmark key facts

Both targets should be met by 2020. Thereby the Danish objectives do not only exceed the DAE targets, Denmark adds yet another important target to its goals, namely upstream bandwidth targets. With regard to the practical implementation of the targets, the Government may set coverage requirements at spectrum auctions, municipalities may impose coverage requirements in tenders, framework conditions for infrastructure investments are set, low rent can be applied for mast/antenna positions in sparsely populated areas, and a relaxing regulation applies to antennas on existing structures in the open country.<sup>56</sup>

Besides, the Denmark’s Growth Plan 2013 announced a specific infrastructure development initiative for the island of Bornholm.<sup>57</sup> The initiative allocated “DKK 30 million annually in 2014 and 2015 to promote high speed broadband on the island of Bornholm.”

<sup>55</sup> Better Broadband and mobile phone coverage throughout Denmark, an outline of policy goals. Available online (Danish version): [https://ens.dk/sites/ens.dk/files/Tele/bedre\\_bredbaand\\_og\\_mobildaekning\\_2013.pdf](https://ens.dk/sites/ens.dk/files/Tele/bedre_bredbaand_og_mobildaekning_2013.pdf)

<sup>56</sup> Broadband Mapping 2013, The Danish Business Authority. Available online: <http://w21.dk/file/475201/broadband-mapping.pdf>

<sup>57</sup> See Denmark’s Digital Growth 2013, Policy Statement to the Danish Parliament by the Danish Government. Available online: <http://evm.dk/english/publications/2013/13-05-29-denmarks-digital-growth>

The Digital Growth Plan agreed upon by the government and all political parties in February 2015 further details growth strategies in different action areas, one of which concerns mobile and broadband coverage throughout the country. Therein, planned initiatives *inter alia* include the release of additional frequency bands (700 MHz) for mobile broadband services, future spectrum auctions, legislation to reduce excavation and improve coordination of civil works and the provision of various measures to facilitate coordination and agreements between telco providers and municipalities. The three remaining action areas are the ICT industry, increased digitization and digital growth in collaboration with the public sector.

More recently, in the context of the “Agreement on growth and development throughout Denmark”<sup>58</sup> (a general strategy for economic growth), a broadband fund - “Bredbåndspuljen”<sup>59</sup> has been established, which provides grants for local associations and municipalities to improve broadband coverage in underserved areas (generally defined as coverage of less than 10 Mbps download and 2 Mbps upload, whereby a special emphasis lies on areas with less than 5 Mbps download and 1 Mbps upload). As

Main Challenges for NGA roll-out in Denmark:

- Coordination among different authorities related to broadband could be improved
- Identification of a take-up target to increase measurability of success
- Enhancement of infrastructure mapping might be useful
- Development of a more integrated strategy (currently no single NBP) is advisable

usual within European state aid framework, regions are eligible when commercial roll-out is deemed unprofitable in the near future. The funding scheme works technology-neutral but requires partial monetary contributions by the local actors and must be established as open-access networks. The budget amounts to DKK 200 million for the period 2016 to 2019.

Overall, Denmark’s primary focus is on the roll-out of high-speed network infrastructure based on private investments with a key role reserved for regional and local actors in coordinating and promoting the process with telecommunication operators. In particular, the now former Ministry of Business and Growth drafted a guide for municipalities and government institutions establishing a legal framework and specifying lease conditions for mobile phone masts. More recently, this competence was transferred to the Ministry of Energy, Utilities and Climate.

---

<sup>58</sup> <http://em.dk/~media/files/2016/16-02-09-aftaletekst-vuhd.ashx?la=da>

<sup>59</sup> <https://bredbaandspulje.ens.dk/> and <https://ens.dk/ansvarsomraader/bredbaand/bredbaandspuljen>



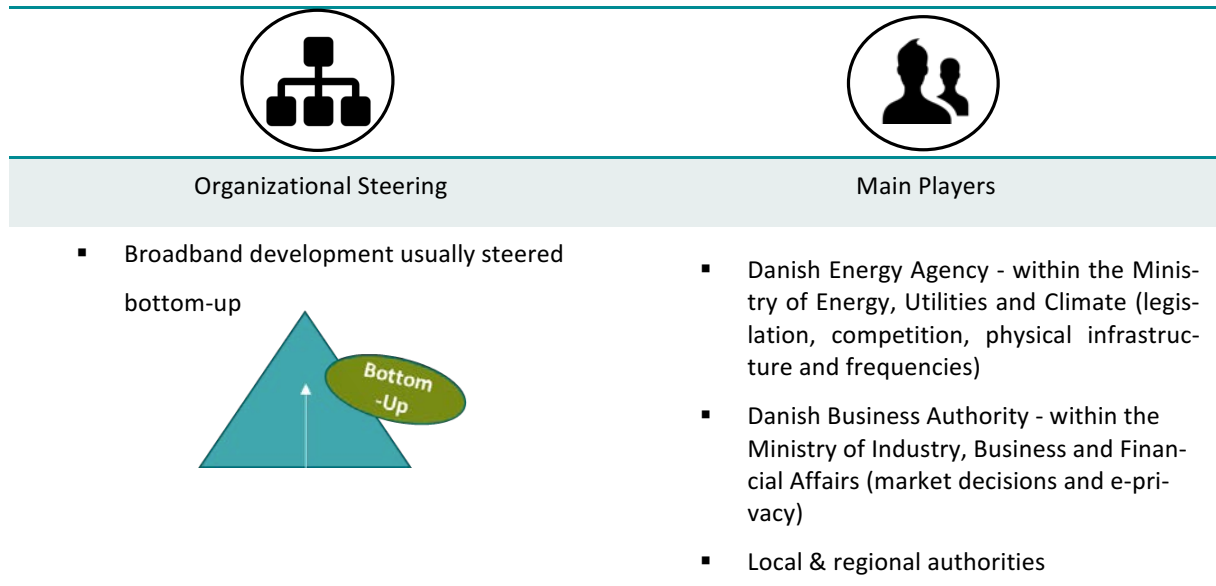


Figure 22 Organizational Steering & Main Players Denmark

#### 7.2.7.2 Feasibility Assessment

In Denmark, currently there is no single document regarded as an NBP; therefore, a variety of documents give overall guidance concerning the market approach. However, in the Danish case, there is a strong bottom-up movement driven by the deployment of infrastructures by utility providers. This decentralized approach reduces the demand for a single national strategy. Nonetheless, deployment by AOs via access obligations is fostered.

Denmark has very ambitious national target (100 % coverage with 100 Mbps download and 30 Mbps upload). Consequently, a **low-medium probability** to achieve the target is presumed. According to the Danish Energy Agency, coverage with 100 Mbps download and 30 Mbps upload is currently at 86 %.<sup>60</sup> Whilst this is already a very impressive figure, putting Denmark ahead of most other European countries, fully covering the remaining few percent of the country will still be a difficult and costly process.

Concerning the DAE coverage target, Denmark is heavily advanced. Currently there is an NGA coverage of 91.7 %. We presume there is a **medium probability** that Denmark might be able to achieve the target, mainly supported by extensive cable networks and local initiatives in underserved areas.

With regards to the DAE take-up target, we presume that there is a **medium probability** the target will actually be met in Denmark. We already see a relatively high penetration rate (calculated as 9.39 % of all households) and a very strong growth for ultrafast bandwidths (+ 422 % from 2014 to 2015), but it remains unsure whether this trend will continue. To support this claim, we see that overall broadband

<sup>60</sup> [https://ens.dk/sites/ens.dk/files/Tele/bredbaandskortlaekning\\_2015.pdf](https://ens.dk/sites/ens.dk/files/Tele/bredbaandskortlaekning_2015.pdf)

growth rates are relatively low (0.7 %), which is an indicator for market saturation, leaving upgraded networks as the main source of ultrafast connectivity.

Currently, the main sources of NGA connectivity in Denmark are upgraded cable networks and FTTP (combined 50 % broadband market share, presumably well higher in NGA alone) while xDSL slowly declines. There are plans to upgrade the cable networks to DOCSIS 3.1 until the end of 2017 and also xDSL networks are still being upgraded for the use of vectoring and pair bonding, resulting in higher speeds. However, it is doubtful that these upgrades directly transfer to getting closer to the national target, especially considering the fact that the currently available DOCSIS 3.0 network already allows for the targeted bandwidths. Therefore, the main issue is how to convince end customers to take-up higher bandwidths, thus increasing the chances for further roll-out. Either the operators need to be convinced to further invest in currently underdeveloped areas or there are demand stimulating measures that aggregate demand and incentivize end customers to get connected.

Both aspects are currently part of the national strategy: For example, there are tax deductions for end customers getting newly connected or upgrading their connection and soon there will be special mortgage loans for operators, decreasing the cost for deployment. In this regard, these measures will be extremely important for the achievement of Denmark's national target and the DAE targets.

Whilst Denmark achieved its current status by relying on a strong bottom-up movement and variety of different initiatives and projects, developing a more integrated strategy (thus a single NBP), thereby channelling the country's potential, involving all relevant stakeholders as well as creating and illustrating synergies, could nonetheless prove to be beneficial. Moreover, while theoretically there is a clear division of competences between the Danish Energy Agency and the Danish Business Authority regarding regulation (the former can be regarded as the overall telecom regulator while the latter mainly deals with specific market decisions), in practice, closer coordination between the two in order to avoid ambiguities or confusion will be necessary. Denmark also established a comprehensive mapping tool (tjekditnet.dk), but in the past, the tool has been subject to criticism regarding its usability and the quality of data provided. Currently, also steps are taken to establish a digital mapping for passive infrastructure.

Overall, possessing an already impressive NGA infrastructure, a well above average coverage rate as well as a decent take-up rate, Denmark is definitely among the leading nations in Europe regarding broadband development and therefore seems to be well-prepared for future challenges.

## 7.2.8 Estonia

### Estonia facts & figures

Degree of self-governance:	Unitary state (parliamentary republic)
Population:	1,313,271 (0.26 % of EU) <sup>I</sup>
Population density:	30.3 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	45,227 km <sup>2</sup> (1.11 % of EU) <sup>III</sup>
Topography:	Shallow coastline with 1,520 islands and moraine landscape in the south
Fixed BB incumbent market share:	Elion: 58 % (EU average: 41 %)
NGA coverage:	86 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	19.16 EUR <sup>61</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 23 Estonia facts & figures

<sup>61</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.8.1 Key Features

In April 2009, Estonia published a national broadband strategy entitled “development vision of next generation broadband network in Estonia.”<sup>62</sup> The document envisages connecting all houses, apartments and offices with new fibre-optic connections and providing a minimum download speed of 100 Mbps. Estimated investment requirements accrue to EEK 5 – 6 billion (ca. EUR 320-389 million). Operators would

<b>National Broadband Plan of Estonia: key facts</b>	
Main strategic document(s):	Digital Agenda 2020 for Estonia
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 60 % HH penetration with 100 Mbps by 2020</li> </ul>
Identical to DAE-Targets:	No (higher take up target)

Table 24 NBP Estonia key facts

finance the roll-out to a large extent from their own funds, except for a share of EEK 1.5 billion (ca. EUR 95 million) to be obtained from EU funds.

In early 2014, Estonia updated its targets and measures for broadband development as part of its new Digital Agenda 2020 for Estonia.<sup>63</sup> The country aims at providing all residents with internet access of more than 30 Mbps and achieving at least 60 % household subscription rates for speed of more than 100 Mbps. More generally, Estonia’s Digital Agenda is meant to provide general guidance for creating a well-operating national information and communication technology environment. The development of country-wide NGA networks is deemed an essential component thereof.

A distinguishing feature of the Estonian strategy is that it also sets objectives with regard to mobile networks as well as the level of “internet freedom”. On the one hand, the target is to achieve mobile internet access levels greater than 80 % throughout the country. Relatedly, by making more frequencies available on the spectrum, Estonia also intends to help to increase broadband coverage in underserved areas. On the other hand, the country desires to rank among the top five countries in the world with respect to internet freedom (as measured by the Freedom House Survey’s indicator “Freedom on the Net”).

These goals are coupled with concrete initiatives, which include the measures for broadband roll-out in areas with market failure:

<sup>62</sup> Available online (English Version), URL: [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4977](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4977)

<sup>63</sup> Available online (English Version), URL: [https://www.mkm.ee/sites/default/files/digital\\_agenda\\_2020\\_estonia\\_engf.pdf](https://www.mkm.ee/sites/default/files/digital_agenda_2020_estonia_engf.pdf)

- support for broadband roll-out by reducing administrative burdens (simplifying legal frameworks)
- obligation to install last-mile connections into any new public funded objects
- promoting community initiatives and
- supporting the development of last-mile connections.

In addition, the government strategy emphasises spectrum will be made available if required and the transition to IPv6 will be promoted.

Overall, with this diverse set of output targets and action areas, Estonia exceeds the EU’s DAE targets. The implementation of the strategy in Estonia is steered centrally, namely by the Information Society Council led by the Prime Minister. Funding is expected to come from private and public sources, state budget as well as EU structural funds. Finally, Estonia plans to undertake a mid-term evaluation

**Main Challenges for NGA roll-out in Estonia:**

- Accelerate the realization of the EstWin project and allow for a stronger involvement of local actors in it
- Evaluate and enhance the capabilities of ELASA (non-profit organization steering the EstWin project)
- Stagnant fixed broadband take up rate despite high availability
- Mapping system’s level of detail needs improvement for EstWin to develop its full potential

of the implementation of its strategy in 2017. This may result in updating existing targets or instruments taking into account the state of the art.

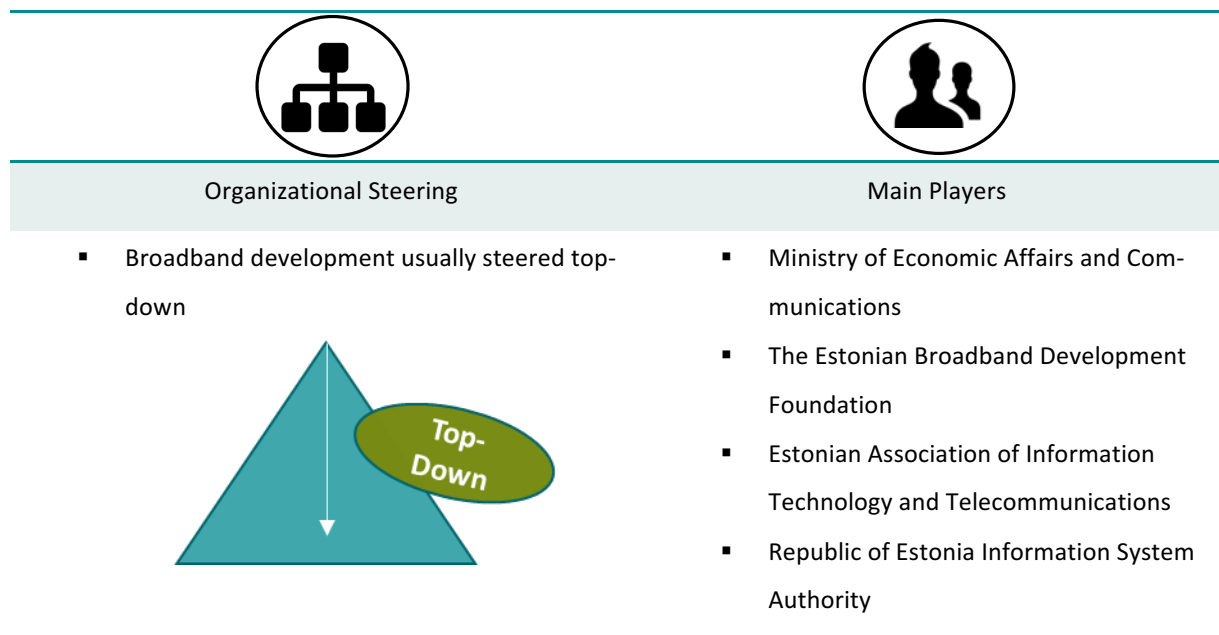


Figure 23 Organizational Steering & Main Players Estonia

### 7.2.8.2 Feasibility Assessment

The achievement of Estonia's NBP targets is still possible, if the growth of ultrafast-subscriptions will increase further. Estonia slightly exceeds the DAE take-up target (60 % instead of 50 % of households to subscribe to 100 Mbps or more by 2020). However, we currently conclude that there is a **low probability** that this target as well as the DAE take-up target will be met. Take-up is currently one challenge that exists within the Estonian context. Despite a very high NGA coverage (86.4 %), there is only a minority of households (we calculated 4.82 %) that subscribes to ultrafast-speeds (100 Mbps or more). General fixed broadband penetration (currently 29.9 % as of population) growth is nearly stagnating (0.1 %) and coverage is already very high, which leads to the conclusion that new broadband connections alone will not be sufficient to achieve the take-up target. Therefore, upgrades of existing connections are the main source to achieve the take-up target. We see substantial growth (50 %) within ultrafast-subscriptions, but even if the trend continues, in 2020 there would be only roughly 34 % take-up. Hence, fostering the growth of ultrafast subscriptions and thus reaching the national target or the DAE take-up target respectively still remains a challenge for Estonia.

However, concerning the DAE coverage target, Estonia is well on track and there is a **medium-high** probability that 100 % coverage will be achieved by 2020. The current NGA coverage (86.4 %) is already relatively high despite the delay in the EstWin project. Concerning FTTP coverage, with a coverage rate of more than 70 % and still 50 % in rural areas, Estonia ranks among the top countries in Europe, illustrating Estonia's impressive and future-proof broadband infrastructure.

The EstWin project is crucial for the success of the NBP as there is great potential to close the gap to 100 % coverage. In this regard, closely monitoring and evaluating the process of implementation as well as ELASA's capabilities to successfully implement the project will be important. In order to use EstWin to its fullest potential, transparency is the key. Hence, also setting up a comprehensive mapping of infrastructures so that privately owned operators can establish their access networks in the most efficient manner will be essential for the success of the project. One aspect that needs to be further assessed is the regulatory environment and costs of NGA subscriptions. Estonians pay roughly 3 % of the median income for the lowest NGA subscription, which is EU average but leaves room for further price reductions, especially considering that the incumbent market share is relatively high (58 %). An increased competition and other measures to further incentivize take-up might be useful to tackle the relatively low take-up and thereby improve the chances of Estonia to fully achieve its targets.

Moreover, also the demand side should be fostered further. In this regard, the Estonian NBP already includes several well-defined demand side activities (e.g. improvement of e-Government solutions and ICT skills through a dedicated institute) with the potential to increase take-up.

Hence, possessing already one the most advanced broadband infrastructures in Europe, realizing the full potential of this infrastructure will be the main challenge for Estonia to face in the next years.

## 7.2.9 Finland

### Finland facts & figures

Degree of self-governance:	Unitary state (parliamentary republic)
Population:	5,471,753 (1.08 % of EU) <sup>I</sup>
Population density:	18.0 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	338,440 km <sup>2</sup> (0.83 % of EU) <sup>III</sup>
Topography:	Dominated by lowlands (Coastal Finland and Finnish lake district with extensive forests), uplands in the north (Lapland)
Fixed BB incumbent market share:	N/A <sup>64</sup> (EU average: 41 %)
NGA coverage:	75 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	20.84 EUR <sup>65</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 25 Finland facts & figures

<sup>64</sup> Unlike most European countries, Finland has always been a multi-operator country. Hence, a single incumbent operator which could be subject to comparison with incumbent operators in other countries does not exist in Finland.

<sup>65</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.



### 7.2.9.1 Key Features

Finland is among the few EU countries having adopted a proactive stance on broadband development at an early stage. This is reflected in a series of policy and strategy statements and initiatives, not counting concomitant working papers, reports or alike. Finland's first cohesive national broadband strategy dates back to January 2004, presented by the Ministry of Transport and Communications, with a mid-way update in February 2005.<sup>66</sup> Back then, the primary goal was to increase the number of broadband connections.

National Broadband Plan of Finland: key facts	
Main strategic document(s):	Updated broadband action plan by 2012
Targets:	<ul style="list-style-type: none"> <li>99 % of all permanent residences and offices should be located within 2 km of an optic fibre network or cable network that enables connections of 100 Mbps by 2019</li> </ul>
Identical to DAE-Targets:	No

Table 26 NBP Finland key facts

In December 2008, Finland adopted a new national broadband plan valid for the period 2009 to 2015. This document stipulated two distinct targets, namely to provide all public and private end users with a minimum download rate of 1 Mbps by 2010 and to make NGA networks available to everybody by the end of 2015.<sup>67</sup> In particular, the strategy envisaged the construction of fibre middle-mile networks, therewith locating fibre access points no further than 2 km from virtually all permanent residences or offices. Additionally, Finland introduced a universal service obligation of 1 Mbps for all citizens in 2010. Finland also discusses the auctioning of further frequency spectra for increasing mobile coverage.

<sup>66</sup> Available online (English Version): [http://www.lvm.fi/documents/20181/752245/Government\\_resolution.pdf/e0765a6c-ee90-49d0-89c9-aae0a0343af6?version=1.0](http://www.lvm.fi/documents/20181/752245/Government_resolution.pdf/e0765a6c-ee90-49d0-89c9-aae0a0343af6?version=1.0)

<sup>67</sup> Cf. URL: [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=3264](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=3264); cf. also: <http://www.lvm.fi/-/hundred-mega-broadband-to-be-made-available-throughout-finland-in-2015-772351>

In May 2012, the Finnish government released an updated action plan, albeit without introducing major changes. Finland commits to achieving that 99 % of all permanent residences and offices should be located within 2 km of an optical fibre network or cable network that enables connections of 100 Mbps.

Overall, the Finnish Government opts for a competition-driven, fibre-based network roll-out, with a special focus on assistance for underserved areas (via public funds). Especially with regards to the latter, Finnish authorities are advising local municipal-

**Main Challenges for NGA roll-out in Finland:**

- Development of an integrated NBP is advisable
- Further decrease of the digital divide
- Very low population density
- Increasing number of mobile broadband only users
- Establishing of an infrastructure-mapping tool might foster roll-out

ities on how to set up entities dedicated to deploy a NGA network where market failure occurred; for example, by way of a joint venture of multiple municipalities or in partnership with private operators. In terms of investments, funding from the state, municipal and EU level is expected.

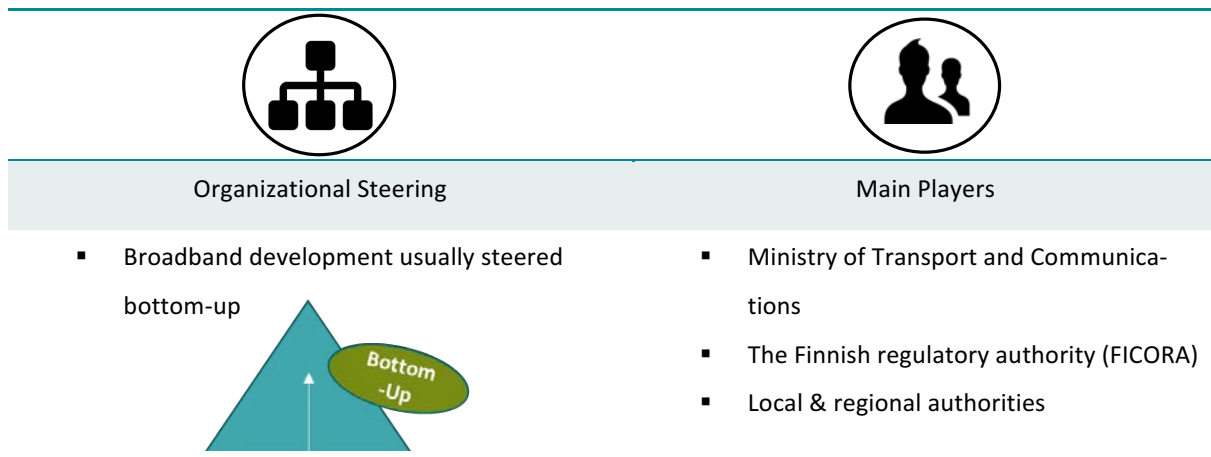


Figure 24 Organizational Steering & Main Players Finland

7.2.9.2 Feasibility Assessment

The chances for the achievement of Finland’s NBP’s target (99 % of all permanent residences and offices should be located within 2 km of an optic fiber network or cable network that enables connections of 100 Mbps by 2019) are rather good. According to the Finnish NRA Ficora, currently 74 % of Finnish households are within 2 km of the next fiber optical connection point enabling 100 Mbps or more. We therefore expect a **medium-high** probability that the NBP’s target can be fulfilled. Fiber optical networks in Finland are still expanding substantially and the distance of 2 km is long enough for relatively simple fulfillment of the criterion. Especially local initiatives currently establishing networks in rural areas will have a significant impact on achieving the criterion. Although Finland has a good chance to fulfill its own national target, increasing actual connectivity throughout Finland will be more difficult

as the distance of 2 km is still a significant hurdle to develop access networks. Especially in sparsely populated areas in North and West Finland, the costs of connection per household are relatively high. In these areas, wireless solutions (often via mobile broadband) have a significant importance and are often regarded a substitute for fixed networks.

Considering the DAE targets, we see that despite the already high rate of fulfillment of the NBP's objectives, there is no automatism between the two sets of targets. Concerning the coverage target (100 % coverage with 30 Mbps), we see that Finland is lagging behind in rural areas. 7.6 % of rural (and 75.1 % of total) Finland currently enjoy NGA coverage. This digital divide is not easy to close. The current investments (especially state aid) contribute to the development of high-end networks within these areas and lead to a further increase of NGA coverage, but reaching full coverage, especially considering Finland's difficult geographic circumstances, still constitutes a major challenge. We therefore conclude that there is a **low probability** that the coverage target will be met. Concerning the take-up target (50 % of households subscribing to 100 Mbps or more), Finland is currently in a good position. We calculated that 15.11 % of households are subscribing to 100 Mbps or more. Furthermore, growth rates of ultrafast broadband are currently at 27.47 %. If this strong growth continues, Finland would achieve 50.86 % take-up by 2020. However, upgrading as an option to achieve the take-up target only exists for some Finns as NGA networks are mainly available in urban and not in remote areas. Moreover, generally fixed broadband penetration rates grow at merely 0.2 %. Thus, it is rather unlikely that the current growth trend of ultrafast subscriptions will continue, leading to an overall rather **medium probability** to achieve the take-up target.

In contrast to other countries, take-up cannot realistically be enhanced by lowered prices. In Finland we see a relatively high willingness to pay for NGA services (especially initial costs), while NGA subscription prices are relatively low (1 % of median income for the lowest NGA subscription). Hence, we conclude that affordability is no concern in Finland, but rather the lack of coverage that inhibits higher take-up rates. In this case, demand is probably higher than supply.

To achieve higher coverage within Finland, supply side measures and transparency measures are the key. In this regard, it would be useful to establish a single document that can serve as an NBP and deliver measures to support higher coverage. Although there is state aid available for the development of broadband infrastructures, reaching countrywide NGA coverage will still be a burdensome process.

Despite the lack of an all-embracing national strategy (decent strategic guidance is provided, but without incorporating many detailed measures accordingly that an NBP would usually provide), Finland has

been making progress in recent years, especially as there are many regional and local activities discernible. There are local and regional operators under public management, governed by state aid rules who provide connectivity in rural areas. These activities, including further demand aggregation, should be fostered. Together with measures to bring down costs of NGA deployment (e.g. enhanced coordination, transparency concerning existing infrastructures, alternative methods of deployment) and the use of non-fixed technologies for remote areas, Finland will be able to achieve an even higher degree of coverage and take-up.

## 7.2.10 France

### France facts & figures

Degree of self-governance:	Unitary state (semi-presidential republic)
Population:	66,415,161 (13.07 % of EU) <sup>I</sup>
Population density:	104.5 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	633,187 km <sup>2</sup> (15.60 % of EU) <sup>III</sup>
Topography:	Mountain ranges in the north-east (Vosges) south-east (Alps) and south (Pyrénées), four river basins and a plateau, island Corsica and oversea territories
Fixed BB incumbent market share:	Orange: 39 % (EU average: 41 %)
NGA coverage:	45 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	17.67 EUR <sup>68</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 27 France facts & figures

<sup>68</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.10.1 Key Features

In February 2013, the French government published its National Broadband Plan (NBP) entitled “France Très Haut Débit”. The plan was updated in 2015.<sup>69</sup> In devising the strategy, wide consultations with stakeholders, investigations and analyses were conducted between 2012 and 2013. With its broadband plan, France commits to covering the entire territory with high-speed broad-

band by 2022. In particular, the French broadband target is to achieve 100 % coverage with 30 Mbps until 2022. France’s broadband targets can be said to be in line with the DAE, albeit with a time horizon for realisation that is two years longer than the DAE.

Successively, the French Government published a convention agreement on the modalities of FTTH deployment (Modèle de « Convention de programmation et de suivi des déploiements FttH, 2013) as well as specifications for network development project applications (Le cahier des charges de l'appel à projets " France Très Haut Débit - Réseaux d'initiative publique [2013] 2015). The government also published a list, which is continuously upgraded, including the network-roll-out projects in the country initiated under the French Broadband Plan.

French officials expect that the national strategy will require the mobilisation of private and public investments of up to EUR 20 billion. In terms of outreach, French officials run a web-based portal ([www.francethd.fr](http://www.francethd.fr)) which provides a wide array of information, ranging from national documents to information on running projects.

Overall, France predominantly opts for establishing and widening its broadband network infrastructure by FTTH technology. Public initiative networks play a central role in this context. According to the NBP, private operators, local authorities and the state are expected to share the required investments.

#### National Broadband Plan of France: key facts

Main strategic document(s):	France Très Haut Débit
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2022</li> </ul>
Identical to DAE-Targets:	No (longer time frame coverage target)

Table 28 NBP France key facts

#### Main Challenges for NGA roll-out in France:

- xDSL technologies bear a very dominant position
- Decrease of the digital divide is needed
- Further increase of NGA coverage necessary
- Stronger focus on demand side measures advisable
- Simplifying pole access in rural areas

<sup>69</sup> Available online (French version): [http://francethd.fr/documents\\_reference/Cahier-des-charges-PFTHD-2015.pdf](http://francethd.fr/documents_reference/Cahier-des-charges-PFTHD-2015.pdf)

In more isolated areas, satellite, mobile and wireless networks (LTE, WiMAX) are viewed as a viable solution to expand broadband coverage. Public aid is only eligible for areas where private companies do not plan any infrastructure investments in the mid-term.

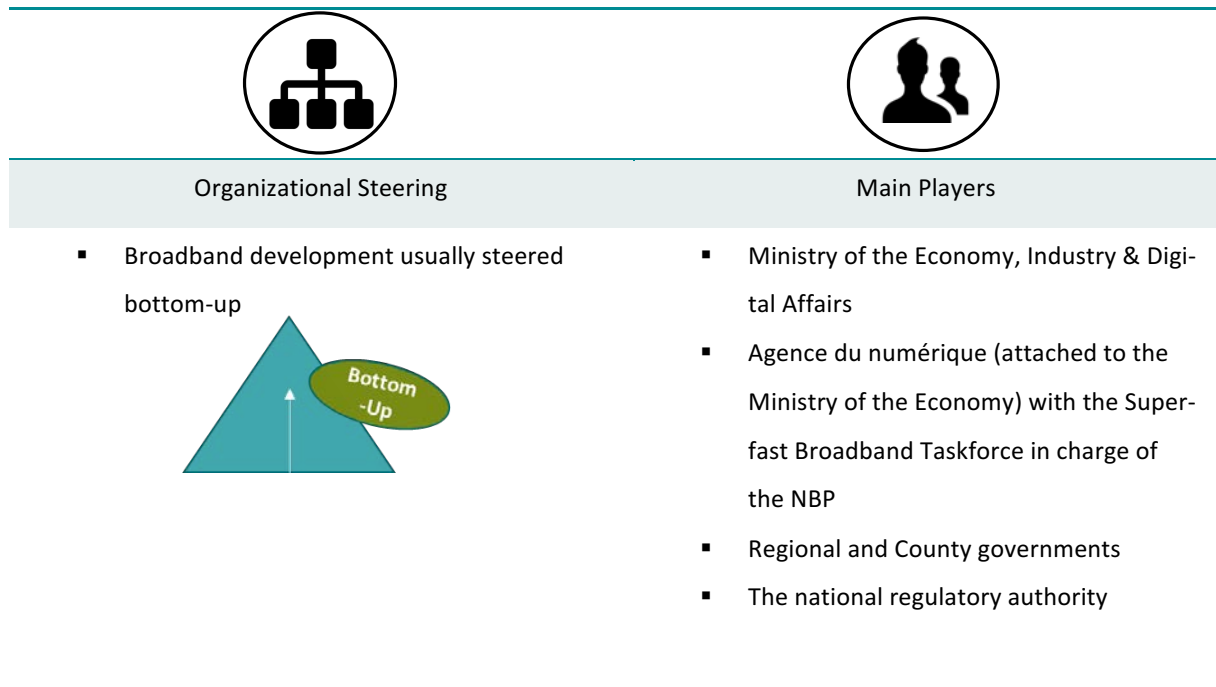


Figure 25 Organizational Steering & Main Players France

### 7.2.10.2 Feasibility Assessment

Given France’s difficult starting situation with a current NGA coverage of 44.8 % in total and 23 % in rural areas including the country’s difficult topographic conditions in some parts of the country, achieving France’s NBP target (100 % coverage with 30 Mbps by 2022) can be considered to be a very challenging task. We estimate that there is a **low-medium probability** that France will actually achieve this target. France has made significant progress in recent years, but with still more than half of the territory uncovered, reaching full NGA coverage will be a tedious process. However, as there is substantial state aid available (roughly EUR 7 billion until 2022) and overall investment is expected to be roughly EUR 20 billion, there is no doubt that France will further increase its NGA coverage rate dramatically, albeit perhaps not to the extent that the entire territory will be covered, even if the investment will be used in total. Moreover, besides its large focus on the roll-out of new FTTH-infrastructure as well as wireless broadband technologies acting as substitute technologies in remote areas, France’s NBP also envisions to upgrade current PSTN networks. Whilst continuing support for increasing bandwidth of PSTN networks may bring France closer to achieving its national target, such measures also at least potentially entail the risk of downgrading the sustainability of business plans of the Public Initiative FTTH Network and thus endanger meeting the demand for higher bandwidths in the future.

Concerning the DAE coverage target (100 % coverage with 30 Mbps by 2020), we expect a **low probability** of success as the target will be even more cumbersome to reach due to the shorter time frame.

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more), there is also a **low probability** that the target can actually be met. We calculated that currently 7.66 % of households subscribe to 100 Mbps bandwidths. Hereby, the very high market shares of xDSL technologies (88 % of all fixed broadband subscriptions) could become an obstacle to that target. Although we see substantial growth for ultrafast speeds (+35.55 %), it remains unsure whether supply can fully keep up with that speed of development. The possibility of success will highly depend on the success of several large-scale FTTH projects. As described above, maintaining the balance between the upgrade of current PSTN networks and setting the framework for the envisaged copper to fibre switch in the long run will be challenging.

France's NBP is comparably operational: It defines a lot of concrete measures, underpinned by timeframes, responsibilities and monitoring procedures. There are several managerial and organizational measures (e.g. project controlling, highlighting the relevance of local authorities, central task forces) as well as supply side measures (including a EUR 3.3 Billion national state aid scheme, financial instruments, PPP models, concession models). However, although supply is gaining momentum and more and more FTTB/H projects are implemented, pushing operators to switch to future-proof technologies continues to be a challenge. We also foresee major challenges concerning the digital divide: Wireless solutions (currently mostly 4G and satellite with 5G probably gaining importance in the future) are considered to be crucial for the supply of rural areas in order to bridge the digital divide, but at the current state, it remains unsure to what extent they will be able to substitute fixed networks.

Besides the NBP, France has several regional broadband strategies and large-scale broadband projects that deploy future-proof technologies accordingly, but in the end, the most decisive question for the achievement of France's national targets will be whether and when efficient supply will be available. Overall, France has identified its deficiencies and envisioned necessary and suitable measures which will have a considerably positive effect on broadband roll-out. While they might not develop enough impact to steer the market forces and thus achieve the national target and the DAE targets on time, they constitute a valuable effort that will lead to a significant enhancement of France's broadband infrastructure, thereby paving the way for France's digital future.



## 7.2.11 Germany

### Germany facts & figures

Degree of self-governance:	Federation (federal parliamentary republic)
Population:	81,197,537 (15.98 % of EU) <sup>I</sup>
Population density:	226.6 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	357,376 km <sup>2</sup> (8.80 % of EU) <sup>III</sup>
Topography:	Northern European Plain in the northern third of the country, hill ranges in middle Germany, mountain ranges in the south (Alps)
Fixed BB incumbent market share:	Deutsche Telekom AG: 42 % (EU average: 41 %)
NGA coverage:	81 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	23.46 EUR <sup>70</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 29 Germany facts and figu

<sup>70</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.11.1 Key Features

In 2014, the German government has adopted the “Digitale Agenda”<sup>71</sup>, valid for the period from 2014 to 2017. The document represents a further refinement and extension of an existing broadband strategy published in 2009 (Breitbandstrategie<sup>72</sup>). The Federal Government’s goal is to provide at least 50 Mbps download speed countrywide until 2018 in both urban and rural areas.

<b>National Broadband Plan of Germany: key facts</b>	
Main strategic document(s):	Digitale Agenda (2014 – 2017) & Digitale Strategie 2025 (not to be considered an NBP)
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 50 Mbps by 2018</li> </ul>
Identical to DAE-Targets:	No (more ambitious coverage target)

Table 30 NBP Germany key facts

With these ambitions, Germany exceeds the DAE targets. Additional pursued objectives of the “Digitale Agenda” are the promotion of mobility and the support of new services in this context, the digitalisation of the economy as well as the economic utilisation of new digital potentials for health care and medical services. The Ministry of Transport and Digital Infrastructure and the Ministry of Economic Affairs and Energy were leading the process of developing the Digital Agenda, supported by several other ministries that are responsible for impacts of digitization in their respective areas of influence. In terms of technology, the German strategy aims to achieve an efficient mix of different technological solutions. Generally, the “Digitale Agenda” works as a government stimulus to optimise the conditions for a market-driven network expansion. This also contains radio frequency regulation measures to provide additional spectrum for mobile internet coverage.

Furthermore, the German government aims to implement the EU’s Cost Reduction Directive 2014/61/CE through different measures to ensure coordination and cooperation between different aspects of infrastructure development. It is planned to transpose the respective provisions to national law in a timely manner. For this purpose, the German government has already contrived a draft law entitled “DigiNetzG.”

<sup>71</sup> Available online (German version): [https://www.digitale-agenda.de/Content/DE/\\_Anlagen/2014/08/2014-08-20-digitale-agenda.pdf;jsessionid=45ADB12CE6E02B57E51889B1B82839E2.s4t1?\\_\\_blob=publicationFile&v=6](https://www.digitale-agenda.de/Content/DE/_Anlagen/2014/08/2014-08-20-digitale-agenda.pdf;jsessionid=45ADB12CE6E02B57E51889B1B82839E2.s4t1?__blob=publicationFile&v=6)

<sup>72</sup> Available online (German version): <http://www.bmwi.de/Dateien/BBA/PDF/breitbandstrategie-der-bundesregierung,property=pdf,bereich=bmwi,sprache=de,rwb=true.pdf>

As an informal governance structure, the Federal Ministry of Transport and Digital Infrastructure (BMVI) has established the “Netzallianz Digitales Deutschland.” This network of governmental Institutions and private sector organisations and enterprises in the field of telecommunications industry discusses and coordinates different aspects involved in broadband development. Recently, the “Netzallianz” devised a joint strategy paper setting out targets, principles and measures in the field of digital infrastructure development, called “Kursbuch Netzausbau” (2014), which complements the federal government’s “Digitale Agenda”.

In 2015, the federal government initiated a national state aid programme worth EUR 4 billion (Bundesförderprogramm) to close the remaining white spots. The programme’s beneficiaries are regional and local actors such as counties, municipalities or special purpose associations of municipalities. Regions where market-driven infrastructure roll-out does not take place are eligible. The budget partially stems from auctioning radio frequencies in the 700 MHz range for achieving rural LTE coverage (second digital dividend).

In addition to the “Digitale Agenda”, there is also a plethora of regional broadband strategies on state-level (“Länderstrategien”), similar to Austria. These differ both with regards to broadband targets and preferred technologies. For example, the city-state Berlin aims at achieving 1 Gbps for the entire metropolitan area. While Baden-Württemberg is eager to develop FTTB in their territory, Bavaria generally opts for FTTC solutions. Regional differences also exist in regard to funding programmes for digital infrastructure projects, funded partially through the second digital dividend funds and supplemented by public sources.

Overall, Germany opts for a technology-mix in realising its national broadband targets. Mobile networks are explicitly stated as a viable technology to facilitate country-wide broadband coverage. In particular, Germany expects increased accessibility and higher data-transfer speeds from 5G technologies starting in 2018.

Fibre-based network projects (FTTB/FTTH) are primarily initiated by local and regional actors. Many efforts from the private sector focus on upgrading existing PSTN (via VDSL, vectoring) and CATV (DOCSIS 3.0) networks.

Main Challenges for NGA roll-out in Germany:

- Ensure future investments and competition in combination with simultaneous expansion of nearshore vectoring
- Increasing number of FTTB/FTTH connections needed
- Inter-ministerial coordination and coordination between federal and regional level needs to be ensured
- Decrease of the digital divide needed
- High price sensitivity

Very recently, the German Federal Ministry for Economic Affairs and Energy (BMWi) issued its own perspective on digital infrastructure entitled “Digitale Strategie 2025”.

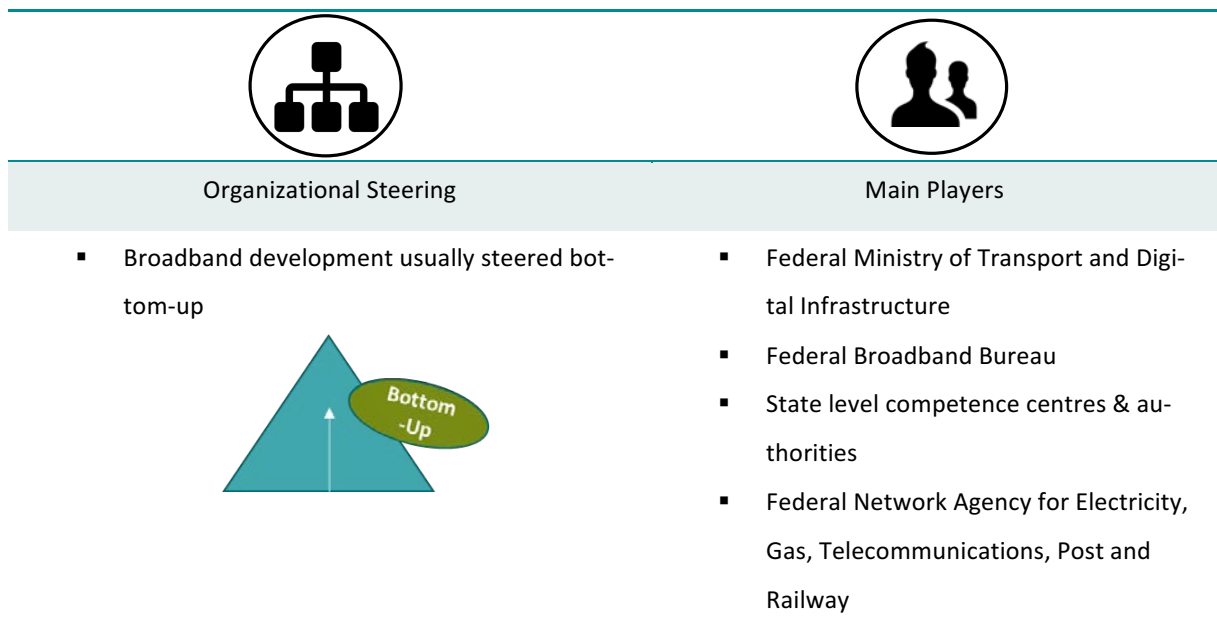


Figure 26 Organizational Steering & Main Players Germany

### 7.2.11.2 Feasibility Assessment

The achievement of Germany’s NBP’s target of 100 % coverage with 50 Mbps by 2018 has a **medium probability** to succeed. Despite several introduced measures which should increase coverage significantly, there is still a substantial gap to bridge (currently, 70.1 % are covered with 50 Mbps). However, the remaining 29.9 percentage points can be achieved if the private sector contributes as declared within the multi-stakeholder process “Netzallianz”. The main driver for the potential achievement is the controversially discussed nearshore vectoring decision and the current national funding programme. Nearshore vectoring will increase the connection possibilities for more than 1 million households across Germany. However, nearshore vectoring could lead to decreased investments and less deployment of FTTB/FTTH and thereby backfire if national targets are increased in the future. Thus, allowing for vectoring whilst simultaneously promoting and ensuring investments in future-proof technologies will be one of Germany’s main challenges in the next years.

The national funding programme supports both gap funding for operators as well as regional/local authorities that wish to invest in passive infrastructures, promoting FTTC and FTTP deployment alike. Both measures combined will lead to a significantly increased NGA coverage, which lets us presume that there is a **medium probability** to achieve the DAE target II as well, especially considering the fact that overall NGA coverage is already at 81.4 % and steadily climbing. Concerning take-up rates for

ultrafast connections (DAE target III), 4.82 % of German households subscribe to 100 Mbps or more. Considering price sensitivity within the German ICT market, we presume that despite substantial growth in this segment, there is a **low probability** to meet this DAE target.

Generally speaking, the NBP of Germany is a strategic document with several ministries involved. All ministries define general provisions on how to achieve the best results concerning digitalization in their respective areas. Concerning digital infrastructures, there are some defined concrete measures as part of necessary standardization and investment processes (e.g. different high-level stakeholder forums and initiatives, spectrum auctions, transparency of infrastructures etc.). Hereby, the NBP acknowledges the structural challenges Germany has (e.g. federal structures, cable networks mainly available in western urban areas, large proportion of underserved rural areas). State aid is part of the NBP and a significant contributor for investments in NGA networks. In this regard, a comprehensive national funding programme worth more than EUR 4 billion has been established. There are also several funding mechanisms at state level, the largest of which is worth EUR 1.5 Billion (in case of Bavaria) and several co-financing programmes concerning the national state aid programme. As a positive aspect, bottom-up special purpose associations are well accepted, often being the beneficiaries of funding schemes and responsible for a major part of FTTB/FTTH deployment – especially in rural areas.

Germany has been lagging behind concerning the provision of free WLAN in European comparison. A major obstacle was that the operator of a WLAN was liable for all misconduct by third parties. After new legislation in early 2016, this problem has been removed which will increase the WLAN coverage significantly.

In terms of responsibilities, given the involvement of different actors at federal and regional level, coordination between these actors will continue to be an important task. While the Ministry of Transport and Digital Infrastructure is in charge of the broadband strategy, other ministries are responsible for other parts of the Digital Agenda and sometimes publish their own perspectives on overlapping topics with differing approaches whilst the regions in turn might have their own point of view. However, provided that the necessary coordination takes place, the involvement of different actor can be seen as a strength rather than a weakness as by means of joining forces, valuable synergies can be created, thereby helping Germany to realize its full potential.

## 7.2.12 Greece

### Greece facts & figures

Degree of self-governance:	Unitary state (parliamentary republic)
Population:	10,812,500 (2.13 % of EU) <sup>I</sup>
Population density:	83.3 per km <sup>2</sup> (EU average: 174.25 per km <sup>2</sup> ) <sup>II</sup>
Size:	131,957 km <sup>2</sup> (3.25 % of EU) <sup>III</sup>
Topography:	Mountainous, peninsular mainland, 227 inhabited islands
Fixed BB incumbent market share:	OTE: 43% (EU average: 41 %)
NGA coverage:	36 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	31.43 EUR <sup>73</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 31 Greece facts & figures

<sup>73</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.12.1 Key Features

In June 2015, Greece has devised a national broadband strategy entitled “National Plan Next Generation Broadband Access 2014 – 2020” (also referred to as NGA plan) under the auspices of the Ministry of Economy, Infrastructure, Tourism and Shipping. Therein, Greek officials essentially reiterate the DAE 2020 targets, aiming to achieve online access with speeds over 30 Mbps for all Greeks by 2020, and 50 % house-

#### National Broadband Plan of Greece: key facts

Main strategic document(s):	National Plan Next Generation Broadband Access 2014 – 2020
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % HH penetration with 100 Mbps by 2020</li> </ul>
Identical to DAE-Targets:	Yes

hold penetration of internet speeds [Table 32 NBP Greece key facts](#)

exceeding 100 Mbps.<sup>74</sup> The Greek approach is reportedly based on a combination of political, regulatory and financial interventions and progress monitoring. There are basically two pillars, also known as action lines, where government efforts will be concentrated:

- Pillar A revolves around setting up a business environment favourable for private investments,
- Pillar B focuses on increasing next-generation broadband access in areas with little perspective for infrastructure and service development.

In particular, the Greek NBP outlines two action areas: “Rural Extension”, designed to intervene in “white areas”, and “Super-Fast Broadband”, aiming to achieve connectivity of 50 % of households with speeds of at least 100 Mbps.

In order to reduce overall infrastructure roll-out costs, Greece intends to transpose and benefit from measures related to the EU’s Cost Reduction Directive 2014/61/EU. This includes access to the existing physical infrastructure, the establishment of mapping tools, the coordination of civil works and transparency of planned projects among public and private actors. More generally, the Greek national

<sup>74</sup> Available online (Greek version): <http://www.yme.gr/getfile.php?id=5836>

broadband plan states explicitly that it views the NGA network infrastructure development as a key strategic policy in helping to overcome the economic crisis and achieve sustainable economic growth.

In terms of investments, the broadband strategy expects the private sector to take on the vast majority of the weight of these investments, with public intervention focusing mostly on areas characterised by market failure. Required funding will range expectedly between EUR 1.36 billion and EUR 4.53 billion.

Greece has no regional broadband plans. However, regional/transregional projects were put in place, according to the Greek NGA plan. In European comparison, Greece ranks among the countries with the lowest NGA broadband coverage. In 2014, Greece was outperformed in terms of NGA broadband coverage regarding download rates > 30 Mbps (European Commission, Digital Agenda Scoreboard), with an availability rate lower than 40 % of households. Importantly, Greece’s existing broadband networks predominantly depend on DSL (99 %), VDSL (34 %)

**Main challenges for NGA roll-out in Greece:**

- Low affordability of telecommunications services and investments
- Geographical conditions and low population density of the remaining 5 – 10 % uncovered areas
- No central infrastructure mapping tool in place yet
- Fostering of FTTB/FTTH deployment needed
- Decrease of digital divide and improvement of digital literacy advisable

and mobile (HSPA, LTE) or satellite solutions. There is virtually no FTTP or CATV available in Greece.<sup>75</sup>

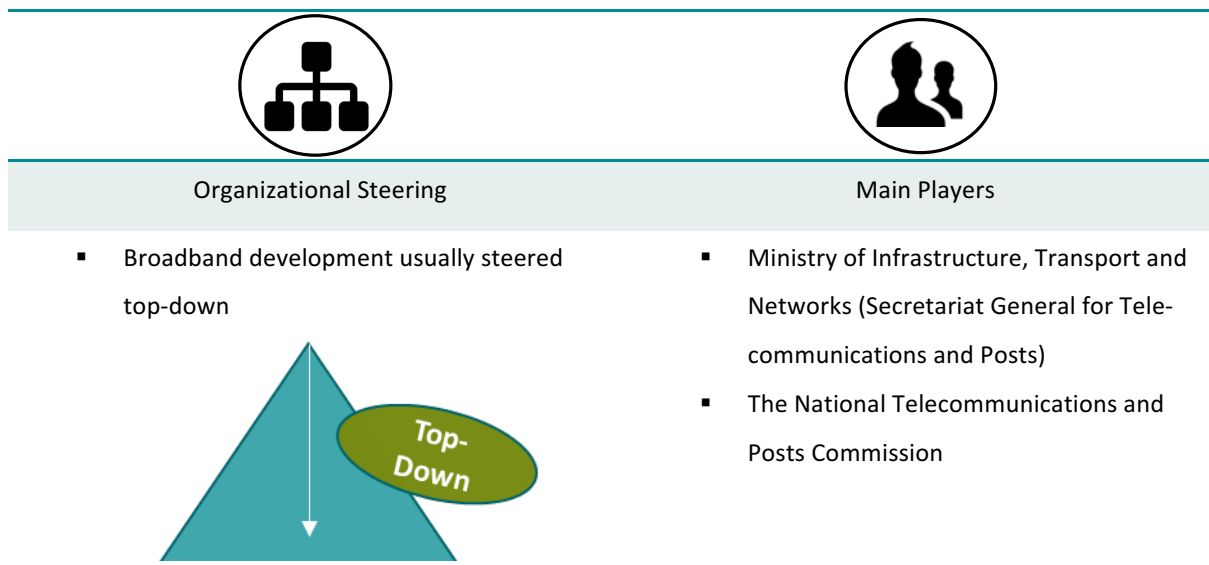


Figure 27 Organizational Steering & Main Players Greece

<sup>75</sup> Cf. Broadband coverage in Europe in 2014 by IHS and VVA



### 7.2.12.2 Feasibility Assessment

The achievement of Greece's NBP targets constitutes a major challenge, especially considering the country's difficult overall economic situation. Concerning the coverage target (100 % coverage with 30 Mbps by 2020), we see that Greece has currently a rather low coverage (36.3 %) and there is only a **low probability** that this coverage will improve so drastically for the target to be met.

In Greece, OTE is the only provider that has substantially invested in infrastructure for the provision of NGA services via VDSL technologies, both on retail and wholesale basis.<sup>76</sup> However, the vast majority of existing PSTN networks are not NGA networks. As a result, xDSL is still the dominant access technology since cable or FTTH infrastructure do virtually not exist in Greece. Alternative providers' public statements and comments during the public consultation of the Greek NGA plan indicate that they are rather cautious with regard to both investing in FTTC and making use of bit stream wholesale services (by the dominant provider OTE) for providing high speed internet access.

Despite a certain level of competition in the market, consumer prices for NGA connections are above European average (roughly 5 % of the median monthly income is spent for the lowest price compared to an EU average of 3%). In addition, economic hardships and relatively high taxes decrease the affordability for end customers and investments by operators alike. With the exception of investments by the OTE Group (in VDSL and 4G), by Vodafone (in 4G) and Wind (in 3/4G), the remaining providers have practically frozen their investment activities (limiting themselves to low cost investment.)

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), we estimate that there is also a **low probability** to actually meet this target. Currently, a calculated number of 0.01 % of households fulfil this criterion. Again, this is mainly a result of outdated infrastructure in Greece and therefore a lack of supply (copper-based networks as the dominant source of connectivity). Furthermore, despite the wide availability of basic broadband services at competitive prices, the overall penetration rate for both fixed and mobile broadband remains rather low, partly due to affordability, partly due to the digital divide and levels of digital illiteracy in Greek society. Increasing the problem of low investments in fixed networks, there is a rising number of mobile broadband only users.

The Greek NBP identifies several of these issues and clearly defines strategies and measures to tackle them. It is very operational and defines tasks, schedules, responsibilities and monitoring procedures.

---

<sup>76</sup> OTE was the only telecommunication's provider in Greece back in 1998. OTE was partially privatized with the following shareholder distribution: Deutsche Telekom: 40%, International Institutional Investors: 29.5%, Greek Institutional Investors: 10, 7%, Greek state: 10%, Other shareholders: 9.8%.

However, notwithstanding the large efforts made, Greece's resources are currently limited. Although there is state aid and substantial EU funding available, achieving 100 % NGA coverage and thus replacing outdated infrastructure will be a burdensome process. Due to the absence of cable and FTTP networks, there is only a low pressure on the incumbent to upgrade its copper-based network. Other measures to incentivize private investments (e.g. simplification of administrative procedures, digital registry of infrastructures) can, however, contribute to improve the situation. Greece has realized that due to limited resources, the main viable approach is to increase transparency and coordination to reduce the costs for private investments. Hence substantial progress (e.g. transposition of EU cost reduction directive, mapping tools etc.) within this field of intervention should be one of the key priorities for Greece. Thus, despite the country's difficult overall situation, further progress can still be expected.

### 7.2.13 Hungary

#### Hungary facts & figures

Degree of self-governance	Unitary state (parliamentary representative republic)
Population:	9,849,000 (1.94 % of EU) <sup>I</sup>
Population density:	106.1 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	93,011 km <sup>2</sup> (2.29 % of EU) <sup>III</sup>
Topography:	Great Hungarian Plain, North Hungarian Mountains, Austrian foothills in the west
Fixed BB Incumbent market share:	Magyar Telekom: 42 % (EU average: 41 %)
NGA-Coverage:	78 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	15.77 EUR <sup>77</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 33 Hungary facts & figures

<sup>77</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.13.1 Key Features

In 2004, Hungary developed a broadband plan “National Broadband Strategy” laying the fiscal and policy foundation for network roll-out and strategy implementation. In 2007, the document was followed by the so-called Broadband Action Plan (BAP). The latest broadband strategy paper was devised in 2014 under the title “National Infocommunication Strategy” for the period 2014-2020.<sup>78</sup> The current

<b>National Broadband Plan of Hungary: key facts</b>	
Main strategic document(s):	National Infocommunication Strategy 2014-2020
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2018.</li> <li>▪ 50 % HH penetration with 100 Mbps service by 2020</li> </ul>
Identical to DAE-Targets:	No (more ambitious coverage target)

Table 34 NBP Hungary key facts

strategy is in line with the DAE and envisions that all households have access to at least 30 Mbps internet and at least 50 % of the households should have 100 Mbps or faster internet access.

With regard to funding, the National Broadband Plan states that about 180 – 210 billion HUF (EUR 600 - 700 million) of investments are needed in order to assure at least 30 Mbps internet speed for all households in Hungary.

Concerning potential problems and risks in terms of the realisation of the broadband targets, Hungary’s NBP notes the possibility of a shortage of financial resources and EU funds. White spots in rural areas, similar to other territorially bigger countries, represent a problem in Hungary, as well. Hungary’s NBP also includes demand-stimulating measures. In terms of reducing roll-out costs, Hungary commits to establish a detailed infrastructure map, access to public infrastructure and facilities of public utility entities as well as to simplify and shorten construction permission procedures. Overall, the Hungarian broadband strategy centres on promoting market-

<p><b>Main Challenges for NGA-rollout in Hungary:</b></p> <ul style="list-style-type: none"> <li>▪ Stronger involvement of local and regional actors</li> <li>▪ Possibly more national and EU funds needed</li> <li>▪ Stagnant FTTB/H market share at relatively low level</li> <li>▪ Increase of mobile broadband penetration needed</li> <li>▪ Lack of a central infrastructure mapping tool</li> <li>▪ Considerable levy on broadband lines (public utility tax)</li> <li>▪ Relatively high prices for NGA connections</li> </ul>
--

<sup>78</sup> Available online (English version): URL: [http://www.kormany.hu/download/5/ff/70000/NIS\\_EN\\_clear.pdf](http://www.kormany.hu/download/5/ff/70000/NIS_EN_clear.pdf)

based broadband roll-out by enacting adequate public policy and regulatory measures. Where deployment incentives for market players are lacking, credit or tender schemes (e.g. tax relief for broadband developments, allocation funds to support investments, etc.) shall be provided to support network upgrades.

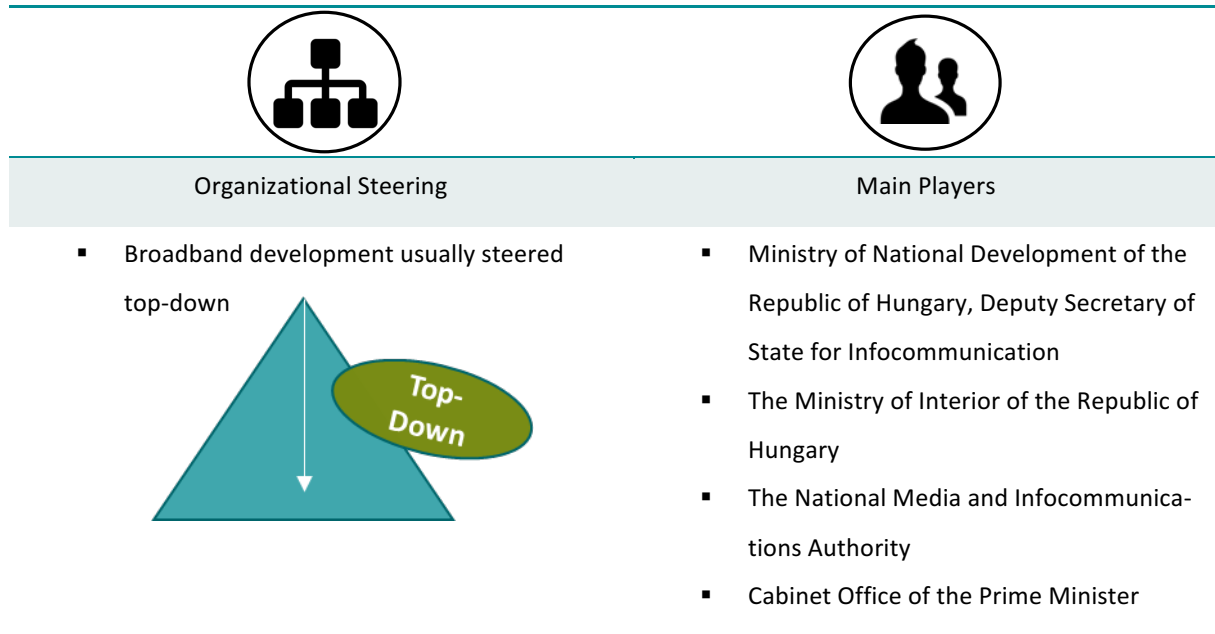


Figure 28 Organizational Steering & Main Players Hungary

### 7.2.13.2 Feasibility Assessment

Hungary has set a considerably ambitious coverage target (100 % coverage with 30 Mbps by 2018). Given this rather short timeframe and the current NGA coverage being at 78.2 %, meaning that 21.8 % are still to be covered in the upcoming years, enormous efforts will be necessary in order to achieve this target. Nonetheless, based on the current situation and plans envisaged, reaching the target is certainly not impossible. Hence, we assume **a medium probability** for Hungary to reach its target. Especially in the context of the “Economic Development and Innovation Operational Programme 2014-2020 (GINOP)”, largely financed by EU-funds, Hungary has set up a substantial funding mechanism, the so-called “Superfast Internet Programme”, thereby making around EUR 250 million of state aid available for broadband roll-out. In total, (public and private investments combined) investments of nearly EUR 500 million are envisaged to be made until 2018. Hence, the achievement of Hungary’s coverage target will largely depend on the success of these investments. Considering the two years longer time frame of DAE target II, **a medium probability** with more positive outlook to reach the target can be assumed.

In any case, Hungary needs to narrow the strong digital divide between urban and rural areas. In urban areas, upgraded cable networks are available and competing with FTTP/VDSL, whereas in rural areas, this kind of infrastructure based competition is missing, resulting in only 20.3 % rural NGA coverage. While in other countries the digital divide is decreased by the use of mobile broadband services, in Hungary this development is currently less important. A low mobile broadband penetration rate of 34.5 % is an indicator of this situation. However, in the Hungarian case it is not a lack of LTE coverage (supply) that leads to low penetration rates. Even in rural Areas there is 84 % LTE coverage. There is still substantial rate of “non-liners” (21.16 %, mainly in rural areas) that hinders a higher demand for (mobile) broadband services.

Take-up is relatively high in Hungary. Concerning the take-up target (50 % of households subscribing to 100 Mbps or more), Hungary is relatively advanced. We calculated a HH penetration rate of 12.86 %. Due to the strong growth for ultrafast subscriptions (+305 %), we expect a **medium-high probability** for Hungary to meet the take-up target. As a result of the strong market share of cable operators (48 % of all broadband connections), the technical requirements for meeting the target are met, given that all of these networks are to be upgraded to DOCSIS 3.0 or DOCSIS 3.1 by 2020. However, affordability might be hindering further take-up at one point in near future, as NGA prices are currently relatively high (4 % of the monthly median income). In this regard, the considerable levy on broadband lines (public utility tax) must also be regarded as a potential hindrance for NGA roll-out and take-up alike. However, the recently introduced VAT reduction on internet services as well as the introduction of a low-cost basic internet package (both part of Hungary’s “Digital Welfare Programme”) can be regarded as an important effort to decrease prices for end-costumers. Hence, if these measures prove to be successful, they could have a significantly positive effect on take-up rates, thus making the achievement of the target even more likely.

The Hungarian NBP shows a mixture of strategic and operational aspects. Besides general statements and a vision for the use of broadband services in Hungary, there are also specific measures, underpinned with responsibilities, schedules and monitoring procedures. For example, an annual evaluation of the strategy is foreseen to be undertaken by the Ministry of National Development. There are several supply side measures (e.g. public networks, support of local cooperatives, state aid, tax deductions, loans, spectrum management). Also, there are several measures to decrease the costs of deployment (e.g. via an infrastructure mapping tool, increased coordination of civil works, simpler permit granting procedures). Furthermore, also the demand side is a significant part of the national broadband strategy. Especially e-Government and ICT skills are expected to increase the overall competitiveness and welfare. The NBP also includes demand side measures such as venture capital for ICT

start-ups, research collaborations, the development of community internet service spaces and the increased use of e-Government services.

Overall, the outlook for Hungary's future broadband development is very positive. The Hungarian NBP is very comprehensive and the most pressing issues are addressed, even though some measures could still be more operational. In this regard, strong incentives for large-scale deployment of FTTP technologies to compete with cable operators are a crucial aspect. In any case, the government also should continue to further increase the acceptance and impact of the NBP's measures .

## 7.2.14 Ireland

### Ireland facts & figures

Degree of self-governance:	Unitary state (parliamentary republic)
Population:	4,628,949 (0.91 % of EU) <sup>I</sup>
Population density:	67.5 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	69,797 km <sup>2</sup> (1.72 % of EU) <sup>III</sup>
Topography:	Coastal mountain ring, low plains at the center
Fixed BB incumbent market share:	Eircom: 35 % (EU average: 41 %)
NGA coverage:	80 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	31.76 EUR <sup>79</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 35 Ireland facts & figures

<sup>79</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.



### 7.2.14.1 Key Features

The Irish Government's National Broadband Plan (NBP) from August 2012 is entitled "Delivering a Connected Society: A National Broadband Plan for Ireland."<sup>80</sup> It focuses on a threefold set of broadband targets:

- 70 Mbps – 100 Mbps available to at least 50 % of the population with a majority having access to 100 Mbps,
- at least 40 Mbps and in many cases much faster speeds, to at least a further 20 % of the population and potentially as much as 35 % around smaller towns and villages and
- a minimum of 30 Mbps available to all.

#### National Broadband Plan of Ireland: key facts

Main strategic document(s):	National Broadband Plan 2012 & the updated Intervention Strategy (December 2015)
-----------------------------	--

- |          |   |
|----------|---|
| Targets: | <ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % HH penetration with 100 Mbps service by 2020, expecting upstream bandwidth around 17 to 21 Mbps</li> </ul> |
|----------|---|

Identical to DAE-Targets:	Yes (except considering the upstream band width)
---------------------------	--

Table 36 NBP Ireland key facts

Upload speeds are also emphasised in the plan, expecting upstream bandwidth "in the region of 25 % to 30 % of the headline download speeds [70 Mbps]", in other words, around 17 to 21 Mbps.

In terms of financing, the Irish strategy centres on a combination of commercial and state-led investments, the latter predominantly in areas of market failure. These areas are particularly difficult to cover given that Ireland has one of the lowest population densities in Europe (67 people per km<sup>2</sup>). The total cost of state investment is around EUR 175 million over the period of the plan. Together with private investments, total costs are roughly about EUR 350 million. Additional resources will come from the release of frequencies of the mobile spectrum. Importantly, the Irish NBP stipulates that any state intervention will involve co-funding with the private sector.

<sup>80</sup> Available online (English version): <http://www.dcenr.gov.ie/communications/SiteCollectionDocuments/Broadband/National%20Broadband%20Plan.pdf>

In December 2015, the Irish government published an updated version of the National Broadband Plan Intervention Strategy. It targets at 100 % coverage of minimum 30 Mbps throughout the country and 50 % take-up of minimum 100 Mbps. It aims at detailing how to ensure high-speed broadband, particularly in areas with market failure. For instance, the report refers to the legislation enacted in 2014, enabling the use of Electricity Supply Board's (ESB) national distribution system to deliver fibre services. As a result, the NBP states, a new wholesale operator has entered the Irish market. The upshot of the legislative change is said to be the increased competition and growing investments in fibre to the home (FTTH) services by two operators – with the perspective of more players entering the market. In October 2015, the Irish government published yet another note entitled "Guidance on Potential Locations of Telecommunications Infrastructure"<sup>81</sup> addressing the engineering appropriateness of siting telecommunications infrastructure equipment on the roads network.

**Main Challenges for NGA roll-out in Ireland:**

- Increase of infrastructure based competition in rural areas could prove useful
- Further decrease of the digital divide needed
- Ongoing increase of overall market share of FTTP needed
- No central passive infrastructure mapping tool in place
- Decreasing demand for ultrafast bandwidths

The Irish broadband strategy also commits to reducing roll-out costs, for instance, by establishing a mapping system for existing infrastructure and emphasizes demand-stimulating measures as well. Furthermore, fixed wireless and mobile broadband services are deemed important technologies in reaching underserved areas.

---

<sup>81</sup> Available online: <http://www.dcenr.gov.ie/communications/en-ie/Pages/Publication/Guidance-on-the-Potential-Location-of-Over-ground-Telecommunications-Infrastructure-on-Public-Roads.aspx>

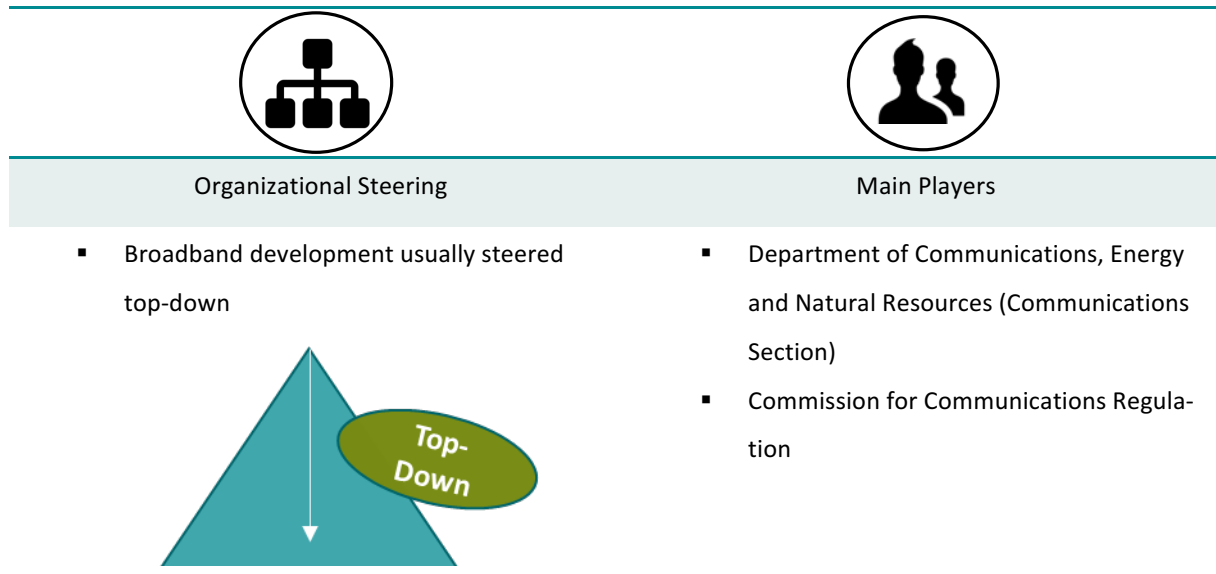


Figure 29 Organizational Steering & Main Players Ireland

#### 7.2.14.2 Feasibility Assessment

The achievement of Ireland’s NBP targets is a challenging endeavour. Concerning the coverage target (100 % coverage with 30 Mbps or more by 2020), we expect a **low-medium probability** to achieve this target. The current NGA coverage in Ireland is currently 80 %, which is a decent coverage rate in EU comparison. However, there is a strong digital divide: in rural Ireland, only 24.9 % can subscribe to 30 Mbps or more. Although there are substantial joint-venture initiatives (e.g. between the state owned ESB and Vodafone to establish 500.000 FTTP wholesale connections by 2018), the timely deployment within areas with a low population density will be difficult. Thus, fully covering the remaining 20 % will probably take more time.

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), we conclude that Ireland’s position is better as the current deployment of fiber already bears fruits. As of today, we calculated that 13.24 % of households already subscribe to 100 Mbps or more. However, surprisingly (and in contrast to all other EU Member States), the demand for ultrafast bandwidths is currently declining (- 9 % from 2014 to 2015). This is an indicator that the demand side is currently not strong enough to achieve the target. Moreover, even though substantial NGA coverage already exists, the availability of ultrafast broadband technologies guaranteeing 100 Mbps is still rather limited. Whilst Ireland’s cable network is fairly well developed (resulting in a current market share of 29%), FTTP does not play yet a significant role within in the market. However, as substantial investments in further supply (especially FTTP) are expected and already ongoing, there is still a **low-medium probability** to meet the target. In this regard, the successful and quick implementation of the above mentioned joint-venture initiatives providing ultrafast connections will be crucial for meeting the take-up

target. Why the demand decreased during the last year is inexplicable. NGA prices are affordable in Ireland (roughly 2 % of the median monthly income) and the economic situation is stable in comparison to the economic hardships of the recent past. In addition, the socio-economic indicators show that internet services are an important aspect of everyday lives of Irish citizens. Therefore, we assume that Ireland is one of the few examples where customers feel the cost/gain ration for higher connections is not worth a premium.

The Irish NBP (and its 2015 intervention strategy) are operational documents. Measures, responsibilities, schedules and monitoring procedures are described in a comprehensive manner. One of the most striking features is the planned wholesale open access FTTP network built via a utility provider/ISP joint venture (mentioned above). Besides this joint venture, the Irish NBP allocates substantial state aid measures to foster the supply side. There are several other measures to incentivize supply and to bring down the cost of deployment (e.g. a mapping tool and the use of existing infrastructures). Moreover, especially the intervention strategy puts a particular emphasis on measures to reach the rural areas of Ireland. There are also several demand side measures, including the connection of public service facilities (especially schools, local authorities).

Overall, Ireland set up several convincing measures and initiatives, although the demand side needs even more focus than it has today to counter the decreasing demand for ultrafast connections. While the targets might not be met entirely by 2020, the Irish strategy paves the way to a high-speed broadband infrastructure in the nearer future.

## 7.2.15 Italy

### Italy facts & figures

Degree of self-governance:	Unitary state (parliamentary republic)
Population:	60,795,612 (11.96 % of EU) <sup>I</sup>
Population density:	201.2 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	302,073 km <sup>2</sup> (7.44 % of EU) <sup>III</sup>
Topography:	Mountain ranges in the north (Alps) and central peninsular (Apennine Mountains), Po Valley and two large islands (Sardinia and Sicily)
Fixed BB incumbent market share:	Telecom Italia: 47 % (EU average: 41 %)
NGA coverage:	44 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	35.33 EUR <sup>82</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 37 Italy facts & figu

<sup>82</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.15.1 Key Features

Italy's first broadband strategy was presented as "Piano Nazionale Banda Larga" (PNBL), adopted into national law n. 69/2009. State aid was approved by the European Commission with decision State aid n° SA.33807 (2011/N). In addition, a separate plan for rural areas was released and approved (National broadband plan for rural areas in Italy) under State aid n. N 646/2009.<sup>83</sup> PNBL envisioned the provision of a download speed ranging from a minimum of 2 to a maximum of 20 Mbps.

PNBL envisioned the provision of a download speed ranging from a mini-

mum of 2 to a maximum of 20 Mbps. The most remote and less populated areas should only have access to the minimum service threshold (2 Mbps) via sustainable wireless technologies. However, the implementation of the plan was delayed for various reasons.

Just after the 2010 approval of the Digital Agenda for Europe (DAE), Italy contrived a new plan for super-fast broadband "Piano Nazionale Banda Ultra Larga" (PNBUL). PNBUL envisages a minimum of 30 Mbps across the country and ensures a potential take-up rate of 50 % of the population for internet connections above 100 Mbps based on FTTH technology. These targets comply with the DAE requirements. The plan provided the structure for the implementation of remaining EU funds programmes on broadband under the 2007-2013 framework and was approved via SA.34199 (2012/N).<sup>84</sup> In March 2015, an updated version of the plan has been published, approved through State aid SA.41647 (2016/N), constituting the framework for the current EU funding period (2014-2020).<sup>85</sup>

#### National Broadband Plan of Italy: key facts

Main strategic document(s):	"Strategia italiana per la banda ultralarga", known as "Piano nazionale banda ultra larga" (PNBUL)
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % HH penetration of 100 Mbps services by 2020 (to be achieved through 85 % coverage with 100 Mbps)</li> </ul>
Identical to DAE-Targets:	Yes

Table 38 NBP Italy key facts

<sup>83</sup> See the corresponding assessments of the European Commission: [http://ec.europa.eu/competition/state\\_aid/cases/242381/242381\\_1352102\\_93\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/242381/242381_1352102_93_2.pdf) and [http://ec.europa.eu/competition/state\\_aid/cases/233970/233970\\_1114455\\_30\\_1.pdf](http://ec.europa.eu/competition/state_aid/cases/233970/233970_1114455_30_1.pdf)

<sup>84</sup> Information derived from the European Commission's assessment of Italy's Digital Plan: European Commission, SA.34199 (2012/N) – Italy Digital Plan – Super-fast broadband, [http://ec.europa.eu/information\\_society/newsroom/cf/dae/document.cfm?doc\\_id=4853](http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=4853).

<sup>85</sup> For the updated plan see: [www.governo.it/sites/governo.it/files/strategia\\_banda\\_ultralarga.pdf](http://www.governo.it/sites/governo.it/files/strategia_banda_ultralarga.pdf); for the European Commission's State aid assessment see: [http://ec.europa.eu/competition/state\\_aid/cases/264095/264095\\_1764969\\_101\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/264095/264095_1764969_101_2.pdf)

The two plans envisage different technical interventions on the broadband network, to be carried out with partly different instruments and financing tools. While the first plan, PNBL, had a major emphasis on providing fibre optic links to central switches (backhaul-link through passive infrastructure), PNBUL targets also the distribution network, planning the construction of passive infrastructure (fibre optic link connecting the central switch to the cabinet (FTTC) or the premises in the case of public buildings (FTTB, FTTH)).

PNBUL defines moreover three main types of intervention (Type A, B and C) in the overhaul of the broadband infrastructure.

- Type A focuses on the development of Next-Generation Access (NGA) networks in public ownership.
- Type B addresses telecom operators in upgrading the “last mile” understood in a broad sense as the set of active devices and carriers.
- Type C provides support to users in isolated areas (such as mountainous areas) where geomorphological conditions render market-based broadband development less viable.

PNBUL, Italy’s current broadband strategy, plans demand side interventions as well (i.e. towards raising the level of civic digitalisation).

The strategy introduces three different scenarios for broadband funding, taking into account the availability of public resources. The “best case scenario”

**Main Challenges for NGA-rollout in Italy:**

- Complexity of the administrative and coordination processes
- Further increase of NGA coverage and take-up needed
- Relatively low FTTP market share
- Incentivisation of more private investments needed
- Increase of ICT skills level of the population advisable

states that about EUR 12 billion investments will be necessary to fully implement the plan of which half is expected to be covered by national and ESIF funds.

Overall, Italy opts for FTTB or FTTH solutions in providing countrywide NGA networks. Mobile, satellite and wireless technologies represent important alternatives to provide internet access in underserved areas. For these areas, the Italian broadband strategy explicitly emphasises the use of

public funds. Towards reducing costs in network roll-out, the Italian strategy also refers to the EU’s Cost-Reduction Directive with its measures. While there are no stand-alone regional plans, given Italy’s federal political structure, regional and local authorities are responsible for defining the operational programmes and setting intervention priorities consistent with the national strategy.

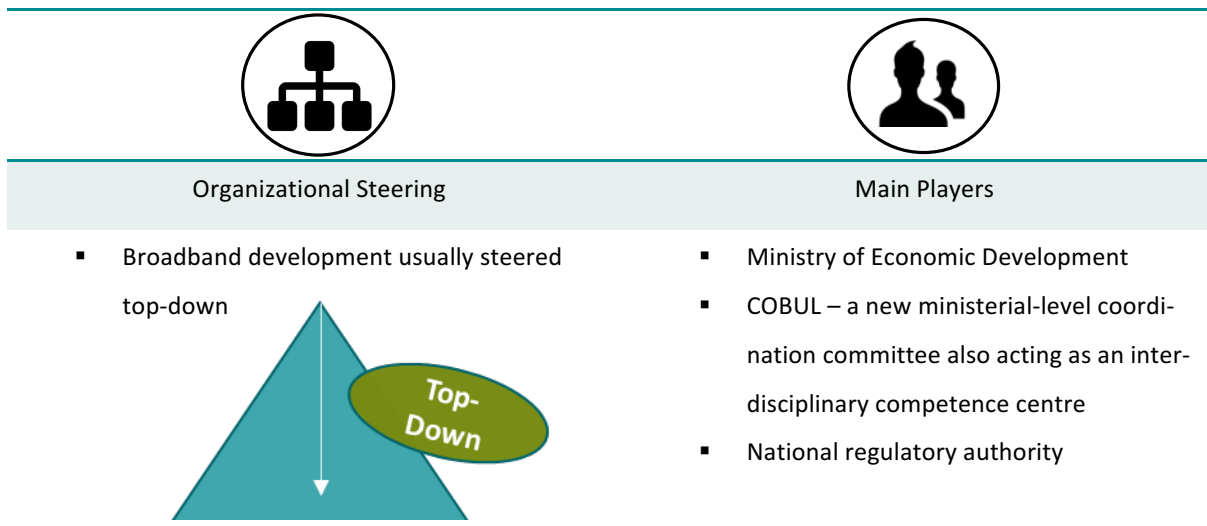


Figure 30 Organizational Steering & Main Players Italy

#### 7.2.15.2 Feasibility Assessment

Achieving the targets of its NBP will be a cumbersome process for Italy. Beginning with the coverage target (100 % coverage with 30 Mbps or more by 2020): the current NGA coverage is 43.9 % and we expect a **low probability** to meet the target. There is a strong digital divide observable: in rural areas, there is basically 0 % NGA coverage. Furthermore, Italy suffers from a lack of CATV and an outdated legacy copper network, which leads to a lack of infrastructure based competition. Therefore, it will be very difficult for Italy to bridge that gap, despite the current deployment process and use of vast amounts of public funds. Especially in rural areas, where demographic and topographic challenges exist, it is cumbersome to achieve a 100 % NGA coverage within the next years, despite the progress made by very advanced regions such as Emilia Romagna.

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), there is a similar picture. We estimate that there is a **low probability** to meet the target. We calculated that 0.54 % of households currently fulfil the criterion. However, the chances to achieve the take-up target are significantly higher than in the case of the coverage target due to substantial progress in urban areas.

There is, however, a chance left that Italy will outperform our prognosis: Before changing its ownership status (it was taken over by a French group), Telecom Italia had committed in early 2016 to a very courageous industrial plan of NGA roll-out, concentrating on covering 40 main Italian towns with FTTH, thereby raising the ambitions of previous planning. In fact, the 2016 – 2018 version of the industrial plan stated as its objective the explicit coverage of 84 % of the population with NGA by the end of 2018



and 98 % with mobile LTE (4G). It calculated a total investment of EUR 12 billion. However, it is questionable whether Telecom Italia will continue to make the same investments in its current situation. Concerning the supply side, one noticeable wholesale dark fibre provider is the private-public group Metroweb Italia, partly owned by the CDP Spa with a minority stake, which is a private holding fully controlled by the Italian Government. The group Metroweb Italia in the last years has started to implement a sizable industrial plan of NGA networks construction (mostly FTTH), starting from the most profitable urban areas of the country, and willing to partner with telecom operators such as Vodafone and Wind to offer the resulting capacity at wholesale level.<sup>86</sup>

In the last few years, under a new countrywide investment scheme, momentum spurred, supported by the first NBP and then again from 2013, with the first implementation of the new 2011 National Plan for Superfast broadband, other operators have started to invest in broadband infrastructures (mostly LTE antennas and selected segments of the FTTC architecture). In Italy, the public intervention has already created a very unique and counterintuitive situation, in which the more socio-economically disadvantaged southern areas are now the best performers for digital connectivity, both in first generation broadband and prospectively also in second generation broadband.

Notwithstanding the supply side, fostering the demand side remains a mayor challenge. This includes a declining number of fixed lines, penetration of fixed broadband that is stalled at current levels, limited consumption of audio-visual content, and a still high ratio of “non-liners” (27.89 %). Given the current state of digitisation, the low relevance of the ICT economy and e-public services in Italy, demand side measures will continue to be crucial for reaching the DAE targets and to ameliorate Italy’s overall digital development.

The Italian NBP comprehensively addresses supply and demand at the same time: It includes several concrete measures to strengthen supply (e.g. state aid, more than EUR 1 billion EU-funds available) and measures to bring down the costs of deployment (e.g. infrastructure cadastre). Furthermore, the new NBP further focuses on demand stimuli, including vouchers providing ICT services and training, specifically designed for the part of the population (or even SMEs) currently excluded or not adequately incentivized to adopt and use broadband and digital services.

The focus on demand side activities is well chosen, but the potential of strengthening administrative simplification and the operative capacity of the public administration should not be underestimated

---

<sup>86</sup> Other utility and network operators have some long distance segments of fiber optics or rings, but their operative dimensions or prevalent activity so far do not compare with the previous telecom operators. The main ones are: the national railway (F.S.) and motorway incumbent companies (Autostrade per l’Italia), the national electricity incumbent (ENEL) and other local utility companies.

and persists to be a challenge. If private investment takes place as planned, administrative procedures and fund management are running efficiently and private demand takes up significantly, it is still possible for Italy to reach its targets. However, irrespective of whether the targets will be met or not, Italy has made substantial efforts in recent years, leading to further improvement in the nearer future.

## 7.2.16 Latvia

### Latvia facts & figures

Degree of self-governance:	Unitary state (parliamentary republic)
Population:	1,986,096 (0.39 % of EU) <sup>I</sup>
Population density:	32.0 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	64,573 km <sup>2</sup> (1.59 % of EU) <sup>III</sup>
Topography:	Largely undulating plains, uplands in the western (Kurzeme) and central part (Vidzeme)
Fixed BB incumbent market share:	Lattелеcom: 59 % (EU average: 41 %)
NGA coverage:	91 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	14.70 EUR <sup>87</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 39 Latvia facts & figures

<sup>87</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.16.1 Key Features

In 2012, the government approved Latvia's National Broadband Plan "The conception of next generation broadband electronic communication network development 2013 – 2020".<sup>88</sup> Latvia has set its national broadband objectives to reach 100 % coverage with 30 Mbps until 2020 and 50 % household penetration with 100 Mbps service until 2020. The overall goal is to ensure the availability of high-speed broadband network access (NGA), especially in scarcely populated and/or remote territories where telecommunications providers do not see any commercial interest. The Latvian NBP has a number of action areas which include:

- developing backbone networks,
- the implementation of the so-called second round of the optical network state aid programme which intends to provide an infrastructure upgrade in areas where there are no optical access points,
- promoting the installation of mobile communications base stations,
- informing citizens about the possibilities of NGA networks,
- setting up a state aid programme for regions characterized by market failure,
- selling lots from the frequency spectrum,
- establishing a database of existing infrastructures where state and telecommunication companies have access and

<b>National Broadband Plan of Latvia: key facts</b>	
Main strategic document(s):	The conception of next generation broadband electronic communication network development 2013 - 2020 (Nākamās paaudzes platjoslas elektronisko sakaru tīklu attīstības koncepcija 2013 – 2020 gadam)
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % HH penetration of 100 Mbps services by 2020</li> </ul>
Identical to DAE-Targets:	Yes

Table 40 NBP Latvia key facts

<sup>88</sup> Summary available online (English version): URL: [http://www.vvc.gov.lv/export/sites/default/docs/LRTA/Citi/Summary\\_of\\_the\\_Concept\\_for\\_the\\_Development\\_of\\_Next\\_Generation.doc](http://www.vvc.gov.lv/export/sites/default/docs/LRTA/Citi/Summary_of_the_Concept_for_the_Development_of_Next_Generation.doc)

- minimising the administrative burden and costs in infrastructure roll-out (including simplified permission procedures).

An interim comparison of planned and actual outcomes of the Latvian NBP with regards to broadband deployment yields the following picture: planned set up of NGA points in rural areas: 165 (actual outcome: 177); planned siting of optical cable connections between main grid and access points: 1,900 km (actual outcome: 1,800 km).

In terms of funding, Latvia’s NBP estimates investment need of about LVL 500 million (EUR 711 million), of which LVL 144.2 million stem from EU funds and LVL 75 million from the private sector. The largest part of financial aid provided by the government went to the previous project

“Next Generation Electronic Communications Network Deployment in Rural Areas” from 2012 – 2015.

**Main Challenges for NGA-rollout in Latvia:**

- Digital Literacy should be improved
- Relatively strong digital divide
- Mainly GPON architecture, few p2p
- Increase of LTE coverage needed
- Transparency concerning existing infra-structures could be improved

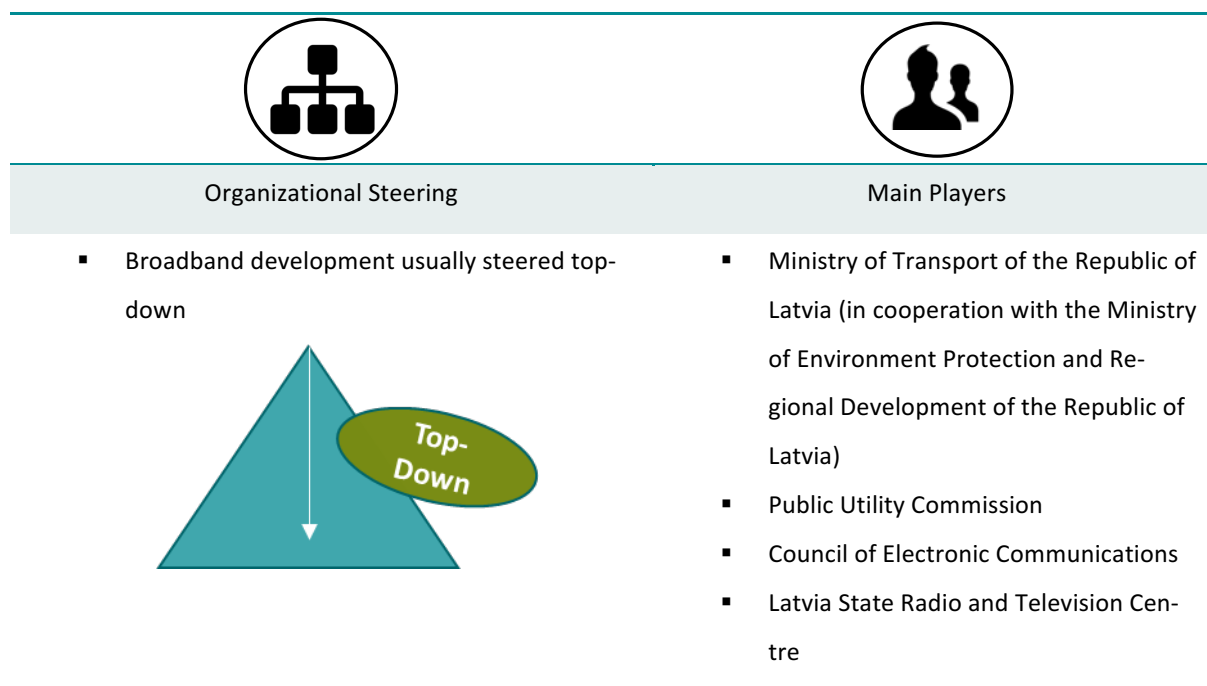


Figure 31 Organizational Steering & Main Players Latvia

### 7.2.16.2 Feasibility Assessment

The achievement of Latvia’s NBP targets is possible. Concerning the coverage target (100 % coverage with 30 Mbps or more by 2020) Latvia has made significant progress in recent years. Currently, the total NGA coverage is 90.7 %. We estimate that there is a **medium probability** that Latvia will be able to bridge that gap. However, there is a strong digital divide: in rural areas, 47.2 % of the population

can subscribe to 30 Mbps or more. Overall rural broadband coverage also remains a critical issue in Latvia. In 2015, 54.9 % of all households in rural areas had access to basic broadband – for the EU-28, rural coverage for basic broadband was as high as 90.6 % in 2015.<sup>89</sup>

FTTP is widely available throughout Latvia (FTTP coverage is approximately 85 %, one of the highest values in Europe), leading to future-proof connectivity. One slightly negative aspect is the usual deployment of GPON architecture as the main technology, while p2p architectures are rare. Concerning the digital divide, VDSL and mobile technologies will probably be able to bridge the gap until country-wide FTTP is available. Hence, if Latvia manages to concentrate its efforts and effectively deploy these bridging technologies, rural areas could be fully covered by 2020 and the coverage target be reached.

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), we estimate that there is also a **medium probability** of achievement. We calculated that the current household penetration rate is 25.3 %. Although this is already an impressive number, it remains yet uncertain whether another 25 % will take up ultrafast bandwidths by 2020. There are several reasons: First, despite the low NGA prices in Latvia in absolute numbers, prices for connectivity are at EU average (roughly 3 % of the monthly median income). Furthermore, overall broadband growth rates are nearly stagnant (+ 0.4 %). Although there is discernible growth for ultrafast bandwidths (+ 11.44 % growth), higher growth rates will be necessary to achieve 50 % take up by 2020.

Despite the tendency for decreased investments in the last few years, market players appear to show sufficient commitment to network roll-out. The incumbent, Lattelecom, dominates fibre roll-outs with bandwidths up to 500 Mbps. In urban areas, several smaller operators offer such services as well.<sup>90</sup> Looking at the Latvian broadband market, it becomes apparent that the incumbent's share has been steadily high since the market liberalisation, although with significant fluctuations ranging from 44 % (2007) to 69 % (2004). Currently, the incumbent's market share amounts to 59 %.

The Latvian NBP tries to tackle most of the issues mentioned above with several measures. It is a very comprehensive and operational NBP with well-defined measures, responsibilities, schedules, indicators and monitoring procedures. It also envisions a regular evaluation regarding its own progress. The parts supporting the supply side are however relatively short. Latvia highlights the importance of private investments, although some state aid funds are available (especially for funding the “middle mile”

---

<sup>89</sup> European Commission, Digital Agenda Scoreboard, Indicator: Rural standard fixed broadband coverage (as a % of households). Definition: Coverage is a supply indicator defined as the percentage of Households living in areas served by xDSL, cable (basic and NGA), FTTP or WiMax networks. Rural areas are defined as those with less than 100 people per km<sup>2</sup>.

<sup>90</sup> Investment and Development Agency of Latvia (2014). Information and Communications Technology Industry In Latvia, p. 6.

and thus connecting previously white spot rural areas). Furthermore, it describes mobile technologies as an option for connectivity in rural areas. Concerning transparency, the main measure to bring down costs of deployment is the development of an infrastructure registry and mapping tool. Regarding the demand side, Latvia focuses on e-Skills, e-Government and raising awareness for ICT topics. In this regard, reaching the elderly rural population will remain a mayor challenge in the upcoming years.

Overall, Latvia has made strong progress during the last few years and has established a remarkable broadband infrastructure. FTTP coverage is already very high, several hundreds of Mbps bandwidths are available for subscription and take-up steadily grows. If Latvia manages to narrow the digital divide (mainly by the use of state aid), it is well possible that Latvia will reach its targets.

## 7.2.17 Lithuania

### Lithuania facts & figures

Degree of self-governance:	Unitary state (parliamentary republic)
Population:	2,921,262 (0.57 % of EU) <sup>I</sup>
Population density:	47.2 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	65,286 km <sup>2</sup> (1.61 % of EU) <sup>III</sup>
Topography:	Lowlands along the coast and in the central part, south-eastern plain, highlands in the north (Žemaičia Highlands) and the east (Baltic Highlands)
Fixed BB incumbent market share:	Teo LT: 46 % (EU average: 41 %)
NGA coverage:	97 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	11.42 EUR <sup>91</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 41 Lithuania facts & figures

<sup>91</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.



### 7.2.17.1 Key Features

Lithuania’s key document relating to broadband development is the “Plan for the Next Generation of Internet Development for 2014 – 2020 in the Republic of Lithuania” adopted in 2014.<sup>92</sup> The Lithuanian broadband goals are congruent with the DAE and aim at providing 100 % coverage with 30 Mbps and 50 % coverage with 100 Mbps until 2020. The declared overarching purpose of the programme is the establishment of an information

#### National Broadband Plan of Lithuania: key facts

Main strategic document(s):	Plan for the Next Generation of Internet Development for 2014 – 2020 in the Republic of Lithuania
-----------------------------	---

Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % HH penetration of 100Mbps services by 2020</li> </ul>
----------	--

Identical to DAE-Targets:	Yes
---------------------------	-----

Table 42 NBP Lithuania key facts

society by increasing the use of ICT technologies and the access to broadband internet as a key economic, political and social tool. This includes initiatives to increase the level of digitisation and demand for broadband access. Lithuania also commits to establishing a mapping system of existing networks.

In the implementation of the programme, funding will come from municipal budgets, EU structural funds and other public sources. Hitherto, Lithuania has reportedly set up public access points in rural areas and public libraries. In particular, in the context of two projects – “Public Internet Access Points in rural areas” and “libraries for innovation” – 700 public internet access points have been established, 83 such points have been updated and broadband internet was installed in 1276 public libraries until 2013, respectively.

#### Main Challenges for NGA roll-out in Lithuania:

- Establishing of official discussion boards for discussing the NBP to increase stakeholder involvement
- Increase of mobile broadband penetration needed
- Few infrastructure based competition
- Increase of digital literacy and ICT skills is advisable

Overall, Lithuania opts for a market-driven roll-out, mainly supporting infrastructure development in areas that suffer from market failure. Investments in next generation access technologies by private

<sup>92</sup> Available online (Lithuanian version): <https://www.e-tar.lt/portal/en/legalAct/7e1fdab0600411e4bad5c03f56793630>

operators are planned be diverse, including mobile technologies (3G, 4G), WiMAX and public WLAN solutions.

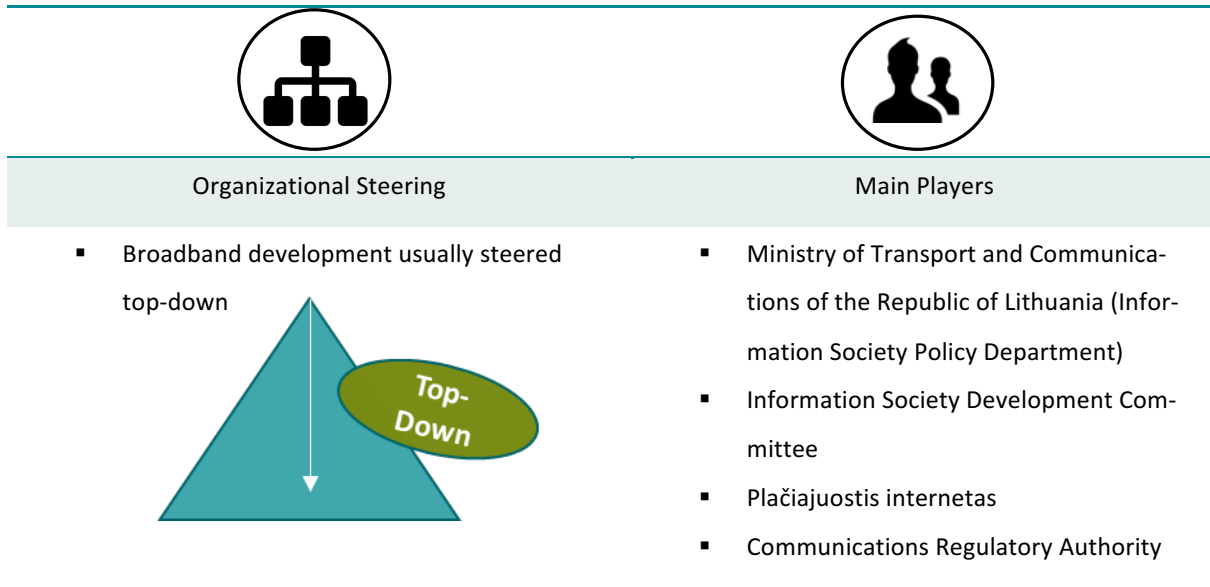


Figure 32 Organizational Steering & Main Players Lithuania

#### 7.2.17.2 Feasibility Assessment

The achievement of Lithuania’s NBP targets is relatively likely. Concerning the coverage target (100 % coverage with 30 Mbps), Lithuania is very close to meeting it. There is already a NGA coverage of 97 %. Even within rural areas, Lithuania achieved an impressive NGA coverage rate of 84.4 %. We are therefore confident that there is a **high probability** for Lithuania to achieve the coverage target or come at least very close to the fulfilment by 2020.

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), we estimate that there is a **medium-high probability** to meet the target. We calculated the current household penetration rate as 10.42 %. Considering the very high coverage and market share of FTTP connections (60 % market share of all broadband connections), the take-up for ultrafast bandwidths is actually lower than one would expect. While affordability is an issue in Lithuania (the lowest NGA prices are at EU average with 3 % of the median monthly income), there seem to be other important factors decreasing demand. As one example, it is obvious that the number of “non-liners” is still relatively high (24.56 %) despite the wide availability of online services. However, despite this small negative aspect, the growth rate for ultrafast connections (+ 59.9 %) lets us assume that Lithuania is well on track and has decent chances to meet both targets by 2020.

The reasons for Lithuania’s success are manifold. The NBP of Lithuania, however, definitely played a role in it. The NBP is operational, describing measures in all possible fields of intervention together

with responsibilities, schedules and monitoring procedures. One example in the sphere of managerial and supply side measures was the introduction of the non-profit organization “Plačiajuostis internetas” as the main body for implementing the NBP. This organization also acts as a wholesale provider for FTTP solutions. As there is no relevant cable network available, the publicly financed deployment of FTTP networks and competition on service level is rather efficient from a macroeconomic perspective, as this approach avoids overbuilding and duplication of infrastructures. Furthermore, Lithuania also made substantial progress concerning transparency of infrastructures and coordination of civil works. What it currently needs is a stronger focus on the demand side; however, the Lithuanian NBP already includes several very strong measures (e.g. free internet service for households with economic hardships, e-Government or capacity building). Overall, we conclude that Lithuania made the right steps with its current NBP. The country is well on track and will either meet the targets by 2020 or only slightly miss them. One remaining task is to further foster the demand side and provide more information on the use of internet services to incentivize the still discernible number of “non-liners” to take up internet services. Moreover, “Plačiajuostis internetas” needs to be monitored and evaluated regularly as it is one of the key actors of Lithuania’s NBP and crucial for its success.

## 7.2.18 Luxembourg

### Luxembourg facts & figures

Degree of self-governance:	Unitary state (constitutional monarchy)
Population:	562,958 (0.11 % of EU) <sup>I</sup>
Population density:	215.1 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	2,586 km <sup>2</sup> (0.06 % of EU) <sup>III</sup>
Topography:	Hill ranges in the northern part (Ardennes), Luxembourg Plateau in the South
Fixed BB incumbent market share:	P&T Luxembourg (POST Technologies): 67 % (EU average: 41 %)
NGA coverage:	94 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	44.60 EUR <sup>93</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

[Table 43 Luxembourg facts & figures](#)

<sup>93</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.18.1 Key Features

In 2010, Luxembourg has devised its “National strategy for very high-speed networks – Very high-speed broadband for all.”<sup>94</sup> The strategy has certain unique characteristics in an EU-wide comparison as it emphasises both down- and upstream rates and sets a series of interim targets.<sup>95</sup>

In particular, specific bandwidth goals are coupled with interim coverage level objectives. The

#### National Broadband Plan of Luxembourg: key facts

Main strategic document(s):	National strategy for very high-speed networks – Very high-speed broadband for all
-----------------------------	--

Targets:	<ul style="list-style-type: none"> <li>100 % coverage with 1 Gbps downstream and 500 Mbps upstream by 2020</li> </ul>
----------	---

Identical to DAE-Targets:	No (more ambitious coverage target)
---------------------------	-------------------------------------

Table 44 NBP Luxembourg key facts

country exceeds the DAE targets by far. Luxembourg commits to reach:

- 100 % coverage with min. 100 Mbps downstream and min. 50 Mbps upstream by 2015 (interim target), and
- 50 % coverage with min. 1 Gbps and min. 500 Mbps upstream by 2020.

Luxembourg centres its strategy on market-driven broadband roll-out based on competition among the operators. Accordingly, the government notes that it “does not intend to support this plan [the broadband strategy] with public financing but will see to favourably influence the costs of network deployment”. This strategy is implemented by the following six measures:

- ensuring access to the local loop,
- putting in place a national construction works register,
- putting in place a national infrastructure register,
- introducing an obligation to roll out associated facilities for optical fibre,
- providing in-house wiring in new buildings,

<sup>94</sup> Available online (English version): [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4854](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4854)

<sup>95</sup> Yet another objective was to achieve 2 Mbps downstream and 512 mbps upstream for all users by 2010. This target has already been met.

- broadening the mandate of Luxconnect (private company created by the Luxembourg Government to improve the national dark fibre network).

Luxembourg’s government supports the development of high-speed satellite access as well as it deems it helpful in reaching even those areas that are remote or sparsely populated with no business case for optical fibre network roll-out. In addition, Luxembourg also specifies a set of cost-reduction measures such as the sharing of existing infrastructure and in-house wiring. In terms of mapping, Luxembourg’s NBP commits to putting in place a national construction works register and an infrastructure database. Overall, Luxembourg emphasises the role of competition and the market in facilitating infrastructure roll-out. The NBP does not state a concrete amount of investments needed. Neither are there any demand-stimulating measures. Nevertheless, in European comparison Luxembourg fares quite well already with regards to broadband take-up. The number of broadband subscriptions per 100 people is over 30, ranking Luxembourg in the upper quartile of Member States.<sup>96</sup>

**Main Challenges for NGA-rollout in Luxembourg:**

- Interim target missed (for 2015)
- No national or European funds available for broadband deployment
- The incumbent is the sole operator to roll out FTTH
- xDSL is still dominant, despite high availability of HFC networks
- Demand side efforts will be needed to encourage the switch from dominant xDSL connections towards FTTB/FTTH

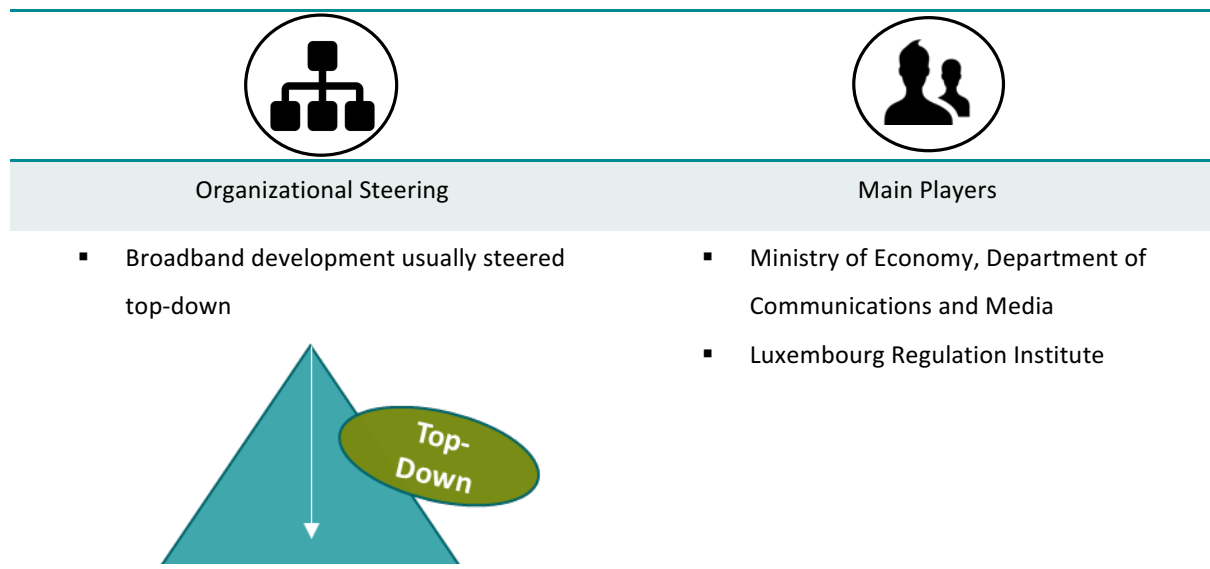


Figure 33 Organizational Steering & Main Players Luxembourg

<sup>96</sup> Cf. Digital Agenda Scoreboard

#### 7.2.18.2 Feasibility Assessment

Luxembourg's NBP's target (100 % coverage with 1 Gbps coverage by 2020) supersedes the DAE coverage target (100 % coverage with 1 Gbps by 2020) by far. Concerning the DAE coverage target, we estimate that there is a **high probability** that Luxembourg can meet the target. Concerning its own coverage target however, there is "only" a **medium probability** that the target can be met. Current NGA coverage in Luxembourg is already at 94.4 %. DOCSIS 3.0 cable networks are widely available and there is already a significant number of homes passed (roughly 50 % usually FTTH GPON). The incumbent is planning to deploy countrywide FTTP networks despite the high availability of VDSL. Often, sufficient ducts are available in Luxembourg which simplifies the exchange of outdated infrastructures.

Concerning the take-up target of the DAE (50 % of households subscribing to 100 Mbps or more by 2020), there is a **low probability** that Luxembourg will meet the target. Despite the overall high availability of NGA technologies in Luxembourg, we calculated that currently 7.33 % of households subscribe to 100 Mbps or more. A negative aspect is a declining rate of broadband penetration (-0.9 %) which indicates a market saturation at 33.6 %. The relatively slow take-up of additional broadband connections is surprising, as the prices for connectivity are affordable (roughly 2 % of the median monthly income). However, if we assume that the existing subscribers all upgrade their existent connections, which is doubtful, but not unlikely (given the current growth rate of ultrafast connections of 63 %), Luxembourg can still come close to meeting the target.

As there is sufficient supply in urban (infrastructure based competition between cable and FTTP) and rural (competition between cable, VDSL and partly FTTP) areas, demand seems not be strong enough.

Luxembourg's NBP includes strategic and operational aspects. There are partly general statements concerning the importance of broadband in general and specifically the importance of private investments as Luxembourg does not intend to spend state aid on infrastructure deployment. There is a clear focus towards FTTP, but a quick increase of network performance (and hereby the use of bridging technologies) is intended. There are some measures underpinned with responsibilities, schedules, indicators and monitoring procedures. However, transparency and demand are identified as the primary fields of intervention, characterized by the most concrete measures. In the case of transparency there are measures such as the establishment of a national construction work register, a national infrastructure register and obligations for in-house wiring. Concerning the demand side, there are measures such as an upgrade of the connections of public administration and academic institutions as well the connection of business parks with gigabit connections. However, Luxembourg refrains from supply side stimuli in terms of state aid.

Overall, Luxembourg is already in a strongly advanced position. The Grand Duchy already has a heavily developed broadband infrastructure and there is high level infrastructure based competition which will exchange VDSL networks with FTTP and upgraded DOCSIS networks. As ducts are available and steps are taken to increase transparency of existing infrastructures, the upgrade of Luxembourg's infrastructure can be done at affordable prices. However, the demand side remains a challenge for Luxembourg: Despite high availability of next-generation access networks at affordable prices and the fact that internet services are very well accepted in Luxembourg, take-up is still lagging behind. Hence, xDSL technologies are still dominant, accounting for more than 75 % of fixed broadband subscriptions, with the rest being equally divided between Cable and FTTP. This is a result that definitely needs more research and calls for a strong focus regarding demand side measures in the future.



## 7.2.19 Malta

### Malta facts & figures

Degree of self-governance:	Unitary state (parliamentary republic)
Population:	429,344 (0.08 % of EU) <sup>I</sup>
Population density:	1,352.4 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	315 km <sup>2</sup> (0.01 % of EU) <sup>III</sup>
Topography:	Three larger inhabited islands
Fixed BB incumbent market share:	Vodafone Malta: 48 % (EU average: 41 %)
NGA coverage:	100 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	42.30 EUR <sup>97</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 45 Malta facts & figu

<sup>97</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

7.2.19.1 Key Features

The first NBP of Malta (“The National Broadband Strategy”) covered the time period between 2004 – 2006. Its successor “Digital Malta 2014 – 2020” was issued in March 2014.<sup>98</sup> The strategy is also communicated via an online portal providing information, amongst others, on Malta’s policy goals, initiatives and performance indicators.

Malta’s infrastructure and other performance targets are in line with the DAE targets: 100 % coverage with 30 Mbps

until 2020 and 50 % take-up rate for 100 Mbps. Content-wise, the Maltese Digital Agenda defines different strategic themes, including digital business, digital citizen, digital government, human capital, regulation and legislation, and infrastructure. With regard to infrastructure in particular, the Digital Malta strategy envisions the following measures:

- to introduce cost effective and timely technologies to keep Malta competitive and vibrant as a digital nation,
- implement infrastructure that is resilient and capable of supporting future demands,
- provide safe, accessible and trustworthy services, while protecting fundamental rights, freedom of expression, personal data and privacy.

<b>National Broadband Plan of Malta: key facts</b>	
Main strategic document(s):	Digital Malta 2014 – 2020
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020.</li> <li>▪ 50 % HH penetration with 100 Mbps service by 2020</li> </ul>
Identical to DAE-Targets:	Yes

Table 46 NBP Malta key facts

<sup>98</sup> Available online (English version): <https://digitalmalta.gov.mt/>

Moreover, Malta’s Digital Agenda emphasises both supply- and demand-side related aspects and covers measures concerning network-roll-out, the sharing of existing infrastructure, as well as the promotion of IPv6 as a preparation for the IoT.

In terms of investments, the NBP states the possibility to “explore the feasibility of private funding and public-private partnerships” for the deployment of infrastructures. However, this only applies within areas where market failure exists. With Malta standing at a leading position within Europe

with respect to NGA coverage, it is highly doubtful, that state aid will be needed in foreseeable future.

Overall, Malta opts for infrastructure-based competition in meeting the DAE targets which, at the time of writing, the Maltese government was already close to fulfilling. Due to the relative small size of Malta, there are no regional broadband plans.

**Main Challenges for NGA-rollout in Malta:**

- Digital literacy needs improvement
- Incentivisation of investments in wireless solutions advisable to complement fixed networks
- Further expansion of FTTB/FTTH, incumbent only recently started FTTH deployment
- No central tool for service or infrastructure mapping available
- Relatively high prices decrease demand for higher bandwidths

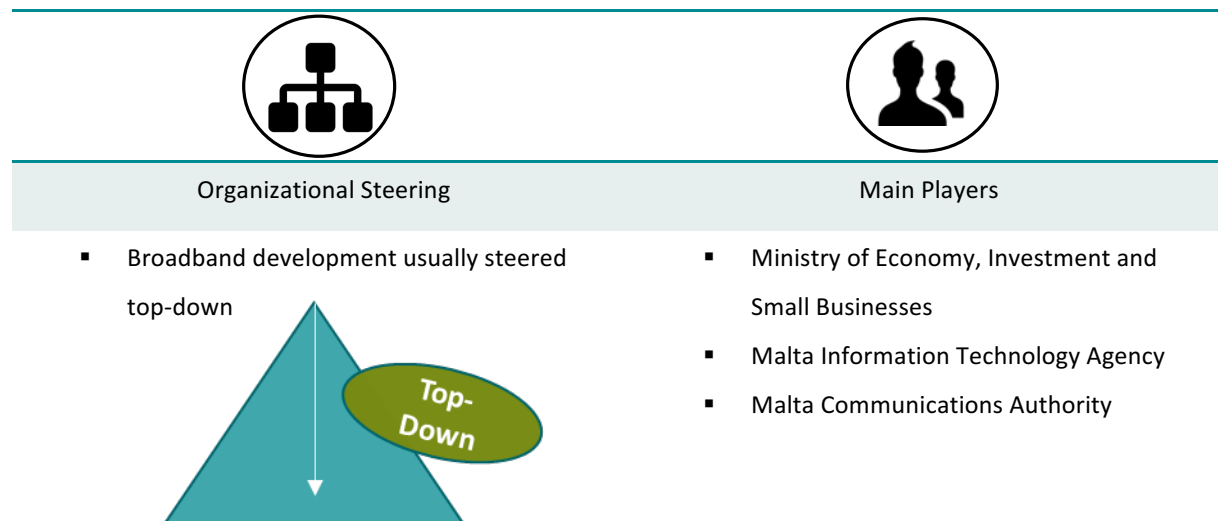


Figure 34 Organizational Steering & Main Players Malta

**7.2.19.2 Feasibility Assessment**

Malta is one outstanding example, as it is the only member state that already met the coverage target of 30 Mbps available for 100 % of the population. The main source of connectivity within Malta is xDSL and cable networks. Both are widely available. Malta’s very high population density favours NGA infrastructure deployment. Densely populated areas often have cable networks available and distances

to the next street cabinet are short enough so that VDSL becomes a viable solution for initial NGA connectivity.

However, despite the widely available NGA networks, take-up is lagging behind. Concerning the take-up target (50 % of households subscribing to 100 Mbps or more), Malta still needs improvement. We calculated that the current household penetration rate with 100 Mbps or more is as low as 0.99 % (with a growth rate of 14 %). We therefore conclude that there is only **a low probability** that the take-up target can be met. This relatively low penetration rates might be a result of different developments: first of all, VDSL and cable currently deliver bandwidths that are sufficient for applications as of today and both technologies are able to deliver reliable NGA (30 Mbps and more) connections within areas of high population density. As demand for ultrafast bandwidths is relatively low, there are few incentives to further invest in technologies that are capable of higher (upstream-) bandwidths. Nonetheless, the incumbent recently started to deploy FTTH, which will probably force the cable operators to keep up and upgrade to DOCSIS 3.1 in the near future. The demand side is lacking dynamism, among other reasons, due to relatively high prices (average 4 % of the Median monthly income for the lowest priced NGA subscription) and a relatively high number of “non-liners” (>20 %). Operators state that the main reason for higher bandwidths throughout Malta are a result of upgraded networks (without premium for end customers) and not the demand asking for better connections.

Malta’s NBP is rather strategic than operational. There are some measures that are described in detail with a plan of implementation and monitoring procedures, while mainly general statements and provisions are included. Especially concerning transparency measures the NBP remains vague. Concerning the supply side, Malta relies on a market driven approach which seems feasible considering the high population density. Mobile technologies are mentioned and regarded as a complimentary. The NBP is very comprehensive concerning the governing structures, stakeholder participation and evaluation of its own implementation. Measures on the demand side, however, Malta’s most pressing issue, are also quite detailed. Malta describes four demand side areas that it wishes to foster (Digital Citizen, Digital Business, Digital Government, Human Capital). Within these areas, there are four example education programs (including curriculae in schools), free WLAN in public spaces, connection of public administration, e-Government initiatives, IPv6 promotion and several others, underpinned by indicators and schedules.

Malta’s NBP tackles the demand side problem with a variety of measures, which will surely have a positive effect and lead to higher take-up rates in the future. While this strong direct focus on the demand side is comprehensible, more detailed measures decreasing the cost of deployment (e.g. via

an infrastructure registry and mapping) or initiatives for the use of existing infrastructures and joint construction, tackling the problem from a different angle, could also be extremely beneficial for the country. All of these are important to increase supply and thus decrease prices which may be an important reason why take-up still needs discernible improvement.

Summing up, altogether Malta has a demographic and topographic structure which is supporting the roll-out of infrastructures with even higher capabilities than those of today. Therefore, there is no doubt that Malta is fit for its digital future.

## 7.2.20 The Netherlands

### Netherlands facts & figures

Degree of self-governance:	Unitary state (Constitutional monarchy)
Population:	16,900,726 (3.32 % of EU) <sup>I</sup>
Population density:	500.7 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	41,542 km <sup>2</sup> (1.02 % of EU) <sup>III</sup>
Topography:	Low coastal area (16 % below sea level protected by dikes, hill ranges in the south)
Fixed BB incumbent market share:	KPN: 42 % (EU average: 41 %)
NGA coverage:	98 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	22.02 EUR <sup>99</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 47 Netherlands facts & figures

<sup>99</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.20.1 Key Features

The most recent strategic document concerning broadband policy is the “Digitale Agenda - Vernieuwen, vertrouwen, versnellen”<sup>100</sup> (Digital Agenda - Renew, trust, accelerate), published by the Ministry of Economic Affairs in July 2016 and defining ICT strategies and action lines for 2016/2017. The document does not contain any specific coverage or penetration targets and also only very little information regarding strategies or action lines for NGA rollout as it is

#### National Broadband Plan of Netherlands: key facts

Main strategic document(s):	Digital Agenda.nl – ICT voor innovatie en economische groei (2011-2015) / Digitale Agenda - Vernieuwen, vertrouwen, versnellen (2016)
-----------------------------	---

Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020.</li> <li>▪ 50 % HH penetration with 100 Mbps service by 2020</li> </ul>
----------	---

Identical to DAE-Targets:	Yes
---------------------------	-----

Table 48 NBP Netherlands key facts

strongly focused on demand side measures, i.e. promoting digitization (e.g. in education, health care, businesses, etc.) and cyber security/privacy. However, it can be regarded as a direct follow-up of its predecessor, “Digitale Agenda.nl - ICT voor innovatie en economische groei”<sup>101</sup> (Digital Agenda.nl - ICT for innovation and economic growth) from 2011, which reiterated the EU’s DAE targets (100 % coverage with 30 Mbps by 2020 and 50 % HH penetration with 100 Mbps by 2020) and has introduced strategies and measures which are still defining the Dutch broadband policy today. In 2011’s agenda, the Dutch government already mentioned that, despite its general acknowledgment, it does not regard the DAE coverage and take-up targets as its ultimate objective, but rather “that by 2020, networks will match the demand from users and suppliers of services.” This is further underlined by the complete absence of quantitative targets and the announcement of a study evaluating future demand and supply in the current agenda.

Generally, the Dutch broadband strategy opts for a market-based infrastructure rollout. It thereby puts key emphasis on the role of local and regional actors in coordinating and simplifying the process. Importantly, it is emphasized that the local government’s principal task is to create the right conditions,

<sup>100</sup> Available online (Dutch version): <https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2016/07/05/digitale-agenda-vernieuwen-vertrouwen-versnellen/digitale-agenda-vernieuwen-vertrouwen-versnellen.pdf>

<sup>101</sup> Available online (Dutch version): [http://digivaardigdigiveilig.nl/images/uploads/img/Digitale\\_agenda.nl.pdf](http://digivaardigdigiveilig.nl/images/uploads/img/Digitale_agenda.nl.pdf); English version: [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4217](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4217)

such as planning and coordinating excavation work, shortening and reducing the costs of licensing procedures or promoting the development as well as the use of applications and services. Where market-based infrastructure rollout fails, local and regional actors may assist and provide for funding and financing instruments. In this regard, also the usage of European public funds is mentioned as an alternative. The central government's role is mainly to facilitate NGA rollout by informing municipalities about the various aspects of a broadband project (e.g. opportunities for state aid within the European state aid rules), ensuring the exchange of knowledge and best practices and providing an overview of current developments.

A distinguishing feature about the Dutch approach is a NGN Task Force that has been appointed to specify the role municipalities and provinces could play in infrastructure rollout. In 2010, it has published a corresponding document entitled "Supersnel Breedband. Voor al uw bewoners en bedrijven."<sup>102</sup> In parallel, the relevant regulatory and statutory framework for local authorities was set out in the Ministry of Economic Affairs' guide entitled "Goed op weg met breedband, handreiking voor gemeentes en provincies."<sup>103</sup> Following the NGN Task Force's advice, the creation of a platform for coordination and experience sharing was initiated. Correspondingly, the G32 (an association of middle-sized municipalities) have established a foundation called City Link ("Stichting Stedenlink"<sup>104</sup>) for collaborative endeavours and best-practice sharing and, more generally, as an intermediary platform for discussions between municipalities, provinces and central government. Municipalities that are not members of the G32 can nonetheless join City Link and participate in its activities. With City Link, the local and regional actors also aim at establishing a link between the Digital Cities Agenda of the G32 and the national Digital Agenda. Moreover, the government is currently considering the need for an umbrella scheme for public funding of broadband projects by local governments to facilitate the procedures for the approval of state aid with regard to European regulation. The overall progress of broadband rollout is assessed annually in the form of a "Broadband Monitor".

Apart from local and regional governments, the Dutch approach also attaches particular emphasis to citizens' initiatives, which can constitute a valuable alternative for rolling out NGA infrastructure, especially in rural areas. Citizens are encouraged and supported in forming such initiatives and thus get

---

<sup>102</sup> Superfast broadband. For all residents and businesses.

<sup>103</sup> Available online (Dutch version): <https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/brochures/2011/08/26/handreiking-breedband/handreiking-breedband-internet.pdf>

<sup>104</sup> <http://stedenlink.nl/>



directly involved in NGA rollout. Information (e.g. regarding technologies, organizational forms and best practices) can be obtained via the online platform [samensnelinternet.nl](http://samensnelinternet.nl).

A priority area in the Netherlands is to grant special attention to rural areas. According to the current digital agenda, in 2015 there were still approximately 330,000 households and businesses with no access to fast internet, mainly located in rural, sparsely populated areas all over the Netherlands. Hence, faster satellite and mobile technologies are supposed to play an important role in bringing NGA to such areas, acting as complementary technologies.

- Main Challenges for NGA-rollout in the Netherlands:
- Increase of number of available ducts advisable, if possible
  - Decrease of local significant market powers
  - No centralized (comprehensive) service mapping tool
  - Partly overbuilding of existing infrastructures

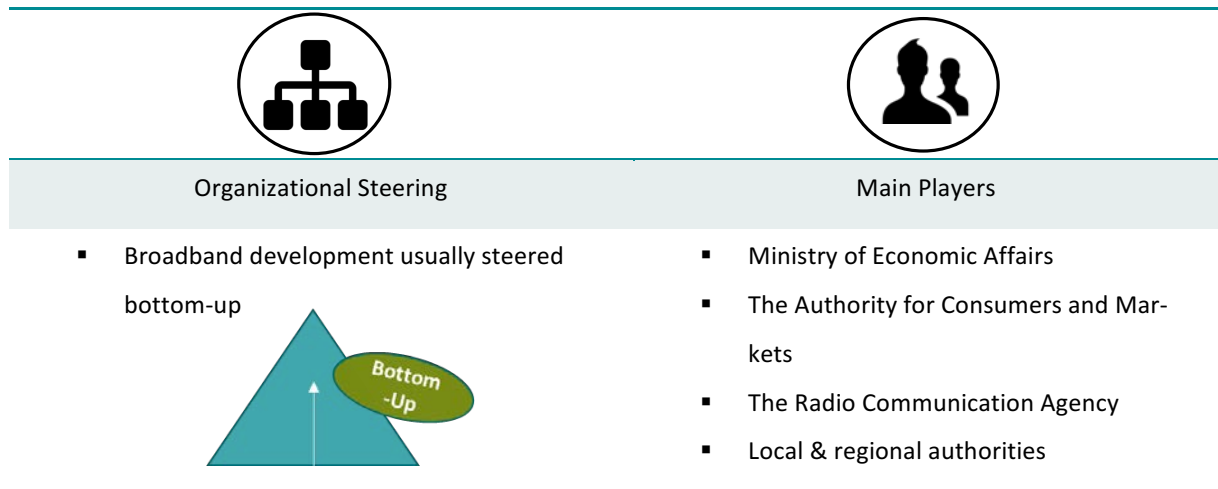


Figure 35 Organizational Steering & Main Players Netherlands

### 7.2.20.2 Feasibility Assessment

The achievement of the Dutch NBP's target is well possible. Concerning the coverage target (30 Mbps with 30 Mbps by 2020), the Netherlands are very close to meeting the target. Currently there is a 98.3 % coverage throughout the country. There is no significant digital divide discernible as rural areas have a similar high value of 97.8 %. Due to the relatively high population density and small size of the Netherlands, xDSL and cable networks are currently feasible technologies to deliver NGA connections to the Dutch citizens. The incumbent now invests in FTTP (after the acquisition of an FTTP-only provider

REGGEFIBER) and there are also local initiatives (e.g. cooperatives) deploying future-proof technologies on their own. Therefore, we estimate that there is a **high probability** that the Netherlands can achieve the coverage target by 2020.

Regarding the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), there are mixed results. Overall, we conclude that there is a **medium probability** the Netherlands can actually meet the target. We base this conclusion on several premises. First, the calculated household penetration rate with said bandwidths is currently 16.53 %. Given a growth rate for ultrafast connections of +33 % per year, the Netherlands would be able to meet the target. However, the growth rate is very strong and it is not without doubt that this trend will continue. Furthermore, the most probable source of higher connectivity are upgrades as growth for overall new fixed broadband connections is relatively low (+1 %) and the Netherlands already have the highest fixed broadband penetration rate across Europe (42.6 % of the population), which will lead to a market saturation at some point. However, digital services are well accepted within the Netherlands and there is no doubt that take-up and coverage will further increase.

The main challenge for the Netherlands will be how to guarantee the upgrade of currently dominant xDSL technologies to FTTP and currently available DOCSIS 3.0 to DOCSIS 3.1 to make the most capable technologies available throughout the country. However, as the availability of ducts is limited and directly buried deployment took partially place, the upgrade to FTTP will require significant investments. Furthermore, the prices for NGA connections in the Netherlands are relatively low (1 % of the monthly median income), which decreases the incentive for operators to further invest in their networks as there is a low chance for an increase in revenue.

The Dutch NBP is rather strategic. Most aspects of infrastructure development are described in a broad sense. Especially concerning the supply side, the Dutch NBP leaves most questions to the market forces. Consequently, the Dutch government describes the providing of a fitting regulatory framework as a main task, to be supported by a task Force on Next Generation Networks. Furthermore, the Dutch authorities recognized that local activities will be decisive for the coverage of the remainder of households currently not covered. Therefore, the foundation "City Link" is pursued to support local activities, share best practices and foster cooperation. The Dutch NBP specifically highlights the role of local administrations that ought to simplify permit granting procedures, increase coordination and promote broadband services overall. Concerning demand side activities, the Dutch NBP's approach includes a variety of ambitious and innovative measures to promote, inter alia, digitization, digital skills, e-Government, digital economy, which should be very beneficial for making the Dutch society and economy

future-proof, even though some measures could be specified in a more comprehensive way (i.e. regarding indicators, time schedules or responsibilities).

Overall, the Netherlands are in a very good position regarding broadband development. There is nearly 100 % NGA coverage, take-up is considerably high and a high population density favours the efficient upgrade and exchange of networks. Furthermore, demand for ultrafast bandwidths is strong and ICT services well accepted.

## 7.2.21 Poland

### Poland facts & figures

Degree of self-governance:	Unitary state (parliamentary republic)
Population:	38,005,614 (7.48 % of EU) <sup>I</sup>
Population density:	124.1 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	312,679 km <sup>2</sup> (7.70 % of EU) <sup>III</sup>
Topography:	Central lowlands (Polish Plain), Silesian lowlands in the west, mountain ranges in the south, baltic coastal plains in the north
Fixed BB incumbent market share:	Telekomunikacja Polska (TK): 30 % (EU average: 41 %)
NGA coverage:	77 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	16.64 EUR <sup>105</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

[Table 49 Poland facts & figures](#)

<sup>105</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.21.1 Key Features

Poland has no single national broadband plan but a series of documents that circumscribe the overall framework, strategy and implementation approach regarding broadband network roll-out. The country's broadband targets are in line with the DAE and envisage 100 % coverage with 30 Mbps and 50 % access for households to broadband internet with 100 Mbps by 2020.<sup>106</sup> Poland's broadband plan also outlines a series of socio-economic objectives including:

- safe and quick access to electronic public services and efficient communication between public institutions, citizens and businesses,
- the development of a digital society,
- the development of modern education,
- the development of research and innovation, and
- the creation of a digital single market.

#### National Broadband Plan of Poland: key facts

Main strategic document(s):	Polish National Broadband Plan (2014), Poland regulatory strategy
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % HH penetration with 100 Mbps service by 2020</li> </ul>
Identical to DAE-Targets:	Yes

Table 50 NBP Poland key facts

<sup>106</sup> Relevant documents relating to Poland's national broadband roll-out plans are: Polish National Broadband Plan (Polish version) (URL: [https://mac.gov.pl/files/narodowy\\_plan\\_szerokopasmowy\\_-\\_08.01.2014\\_przyjety\\_przez\\_rm.pdf](https://mac.gov.pl/files/narodowy_plan_szerokopasmowy_-_08.01.2014_przyjety_przez_rm.pdf)); Regulatory Strategy (Polish version) (URL: <http://www.en.uke.gov.pl/regulatory-strategy-until-2015-11926>)

Broadband infrastructure funding thereby comes from both EU and state funds as well as private investments. Poland's broadband plan states that monetary resources from the EU are made available via the operational programme "Digital Poland" ("Polska Cyfrowa"), valid from 2014 to 2020. No such programme existed in the previous funding period.<sup>107</sup>

Analyses presented with the NBP estimate the total cost of implementation to in the range of PLN 17 to 42 billion (EUR 4 to 10 billion) depending on the technologies to be used (from a mix of wired and wireless technologies up to full FTTH access).

The estimated investments in broadband infrastructure are approximately EUR 1.03 billion, to be accompanied by possible investments from private investors which are estimated to be around EUR 4 billion. In the context of Digital Poland, telecommunications companies will receive funds for the construction, extension or restructuring of broadband internet access and support for e-administration and e-services in collaboration with the local and central government administration. Broadband access below 30 Mbps can be funded only exceptionally, that is, in remote areas.<sup>108</sup> Local government units can use this programme to implement tasks aiming at e-integration and e-activation to increase intensity and quality of the use of internet. It is envisaged by Polish decision-makers to shift the responsibility for the distribution of EU funds in Poland to provinces ("województwa") and therewith increasing the importance of the regional operational programmes. While between 2007 and 2013 local governments handled about 25 % of all funds for Poland, regional and local actors are now responsible for 40 %, thus further opening up to local and regional needs.<sup>109</sup>

Main Challenges for NGA roll-out in Poland:

- Need for more dialogue between all stakeholders
- Relatively high amount of "non-liners"
- Possibly expansion of state aid and other forms of funding needed
- Low rural NGA coverage
- Further increase of fixed broadband penetration needed
- Improvement of digital skills of the population advisable

The Polish government expects additional funding opportunities under the financial instrument "Connecting Europe Facility". In addition, Poland's broadband strategy envisions funding through a long-term funding mechanism for the development of broadband infrastructure from the programme

<sup>107</sup> A non-official source states, that the EU's current cohesion fund budget has allocated EUR 82.5 billion for Poland (2014 to 2020), making it one of the largest beneficiaries among the member states for the current funding period. These funds are implemented by way of operational programmes of which 6 are nationwide and 16 with regional focus. One of these programmes is Digital Poland.

<sup>108</sup> <https://ec.europa.eu/digital-agenda/en/country-information-poland#national-and-regional-broadband-financial-instrument>

<sup>109</sup> Cf. [http://www.roedl.com/pl/en/services/state\\_aid\\_advice/eu\\_funds\\_in\\_poland\\_20142020.html](http://www.roedl.com/pl/en/services/state_aid_advice/eu_funds_in_poland_20142020.html)

"Polish Investments", open pension funds and other investors interested in long-term infrastructure investments. A requirement to make the mechanism work is said to be the cooperation of telecommunications companies with entities of the financial market, based on investments on market conditions, guaranteeing maximised and safe return on investment.

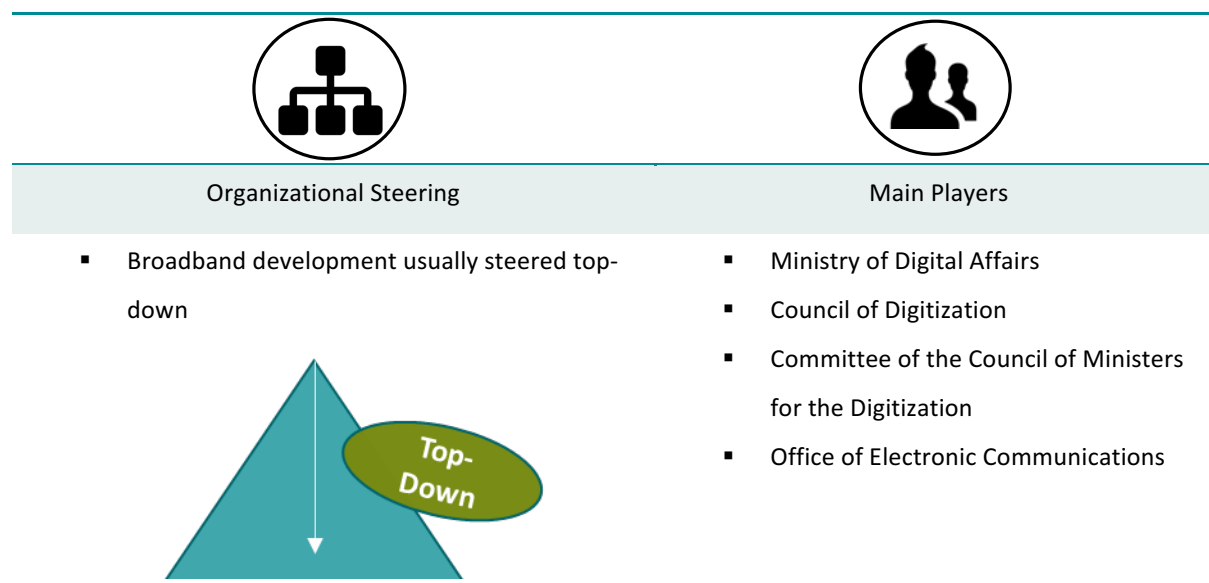


Figure 36 Organizational Steering & Main Players Poland

#### 7.2.21.2 Feasibility Assessment

The achievement of Poland's NBP targets will require large efforts. Concerning the coverage target (100 % coverage with 30 Mbps or more by 2020), we conclude that there is a **low probability** the target can be met. The current NGA coverage rate is 60.7 %. In rural areas, the NGA coverage is significantly lower at 33.8 %. This digital divide is even more visible when examining the LTE coverage (76 % total and 6 % rural coverage). Hence, state aid measures are an important aspect to increase coverage in the near future as there seem to be market failures in some regions and a significant part of the country still needs to be covered both by mobile and fixed technologies alike.

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), the situation is similar: Again we expect a **low probability** for Poland to meet its target by 2020. We calculated that currently 4.23 % of households subscribe to 100 Mbps or more. There seem to be several reasons why the take-up is relatively low. Of course, as indicated above, supply is not very high in Poland which automatically decreases the potential take-up. Furthermore, the demand side itself seems to be struggling. One of the most essential hurdles to overcome is the lack of knowledge and acceptance of its advantages by some social groups, administration and businesses. There are 27 % "non-liners" and all other socio-economic indicators are below EU targets. Furthermore, affordability

seems to be an issue. The prices for NGA connections (lowest price) are currently about 4 % of the median monthly income and hereby above EU average (3 %).

To tackle these issues, there is a substantial use of state aid. Vast national and EU-funds (more than EUR 1 billion in the current funding period) are available to deploy new (backbone and access) networks and upgrade existing ones. According to the government, in 2015 the main broadband network has already been established. In frames of 14 projects, 29,345.87 km of network has been built. The project was realized through a cooperation of regional authorities and commercial developers. In the long-term, the results will be used by companies to provide access for private and commercial clients, thus making a significant contribution for increasing coverage and take-up alike.

The Polish NBP is very comprehensive and describes a number of measures, underpinned by responsibilities, schedules, indicators and monitoring procedures. A special emphasis is laid on regulatory measures to provide for a level playing field and access to existing infrastructures. Regarding the supply side, as described before, state aid is considered an important part of broadband development. Mobile technologies are considered as an important bridging step. Next to the highlighted importance of private investments, PPP models are also part of the NBP. Poland also planned to bring down the cost of infrastructure deployment by means of increased coordination and transparency concerning existing infrastructures. A mapping system for planned and existing infrastructures is part of the plan as well as an active promotion of joint construction and guidelines for co-deployment.

Finally, the demand side is also part of the NBP. The Polish government describes measures such as connecting schools, hospitals and public administrations. Furthermore, the development of e-skills, e-services and e-government is prioritized to increase demand and thus make more areas economically viable across the country.

Overall, Poland has already made substantial progress and will continue to do so. For the future, an even stronger focus on the already growing number of FTTP investments, incentivising further intensive financing, both from the side of investors as well as financial institutions, would be desirable. Together with well-spent state aid funds, there is a good chance that Poland will significantly improve its infrastructure and prepare itself for its digital future.



## 7.2.22 Portugal

### Portugal facts & figures

Degree of self-governance:	Unitary state (semi-presidential representative democratic republic)
Population:	10,374,822 (2.04 % of EU) <sup>I</sup>
Population density:	112.8 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	92,226 km <sup>2</sup> (2.27 % of EU) <sup>III</sup>
Topography:	Low coastal area, lowlands in the north, uplands north of the Tejo river, hill ranges in the south and two archipelagos (Azores and Madeira)
Fixed BB incumbent market share:	Portugal Telecom: 46 % (EU average: 41 %)
NGA coverage:	91 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	32.36 EUR <sup>110</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 51 Portugal facts & figures

<sup>110</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.22.1 Key Features

Portugal's National Broadband Plan ("Agenda Portugal Digital") is in line with the DAE targets (100 % coverage with 30 Mbps until 2020, 50 % take-up rate for 100 Mbps).<sup>111</sup> Portugal's NBP must be regarded more as a law listing several objectives and responsibilities rather than an integrated plan concerning specific actions by a specific institution. The NBP of Portugal is a direct update of Portugal's previous NBP published in 2012<sup>112</sup> and also sets

<b>National Broadband Plan of Portugal: key facts</b>	
Main strategic document(s):	Agenda Portugal Digital (Diário da República, 1.ª série — N.º 74 — 16 de abril de 2015)
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % HH penetration with 100 Mbps service by 2020</li> </ul>
Identical to DAE-Targets:	Yes

objectives concerning the digital [Table 52 NBP Portugal key facts](#)

economy and e-public services. Amongst others, these include the following additional goals:

- to create the conditions to increase the number of electronic commerce businesses by 55 % until 2020 compared to 2011,
- to create the conditions to increase ICT exports by 25 % until 2020 (as compared to 2011),
- to promote the utilisation of ICT for decreasing the number of people that have never used the internet to 23 % until 2020,
- to provide internet access with 100 Mbps for 50 % of households by 2020,
- to promote digital public services so that the usage of such services converges with EU average by 2020

<sup>111</sup> Available online: <https://dre.pt/application/file/66991457>

<sup>112</sup> See <https://dre.pt/application/dir/pdf1sdip/2012/12/25200/0730707319.pdf> and [http://www.entelis.net/sites/all/files/entelis\\_fact-sheet\\_crisostomo\\_digitalagendaportugal.pdf](http://www.entelis.net/sites/all/files/entelis_fact-sheet_crisostomo_digitalagendaportugal.pdf)

Other measures of Portugal's NBP are the promotion of appropriate levels of symmetry with regard to broadband lines and the improvement of mobile networks (e.g. LTE) by extending levels of coverage across the country.

In terms of funding, the Portuguese NBP states that almost EUR 2.5 billion had been channelled into developing infrastructure until 2012. Close to EUR 1.1 billion were invested by fibre infrastructure operators in the market, EUR 600 million were invested by various market agents in the development of services and content and EUR 750 million in the development and modernisation of networks. In the context of the rural networks programme, a budget of EUR 200 million was allocated, including EUR 106 million of public subsidies.

There are currently no specific regional broadband plans available, but regional development strategies that cover broadband-related topics. Large-scale public funding for broadband deployment ended several years ago. Portugal trusts in a market-driven approach ever since.

**Main Challenges for NGA roll-out in Portugal:**

- More support for bottom-up initiatives might be useful
- Establishing of public discussion boards concerning the NBP could further increase stakeholder involvement
- Further incentivisation of operators to connect the last mile possibly needed
- Digital divide between urban and rural areas
- Take-up rates are a challenge due to economic hardship, high prices and a lack of digital skills and knowledge

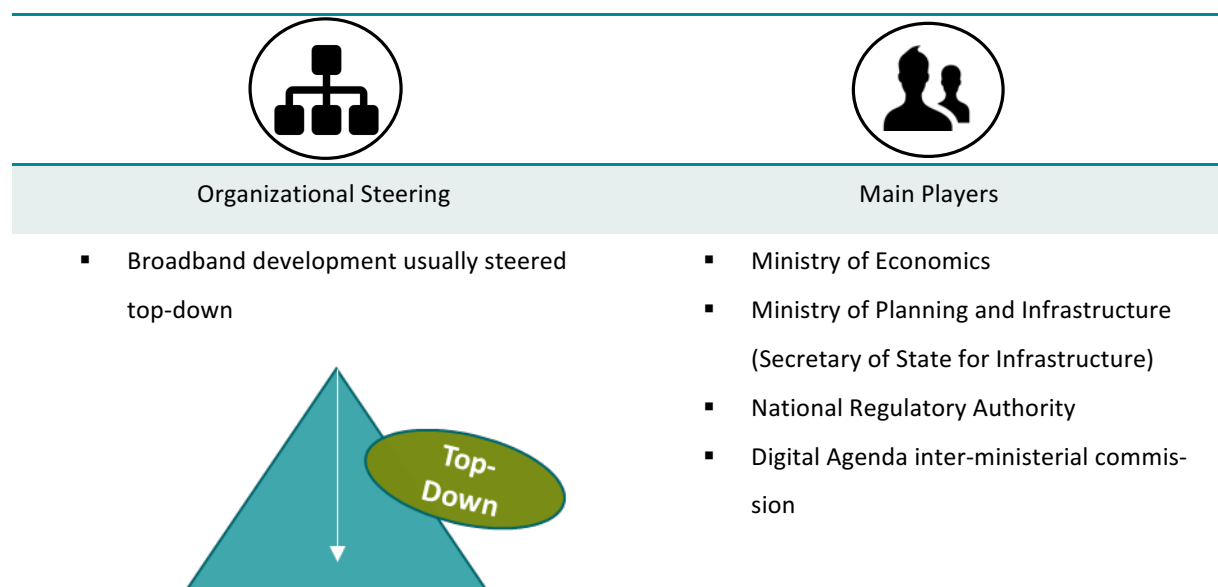


Figure 37 Organizational Steering & Main Players Portugal

#### 7.2.22.2 Feasibility Assessment

The achievement of Portugal's NBP targets is possible. Concerning the coverage target (100 % coverage with 30 Mbps by 2020), there is a **medium probability** to actually meet that target. Portugal already has 91 % NGA coverage and there are still substantial investments by the private sector. However, the reason why there is no high probability of achievement is that there is a discernible digital divide (49.5 % NGA coverage in rural areas). LTE is not a feasible substitute either as rural LTE coverage is 67 % and LTE as a shared medium cannot be considered technologically en par. Concerning the deployment of new networks, local and regional administrations are more and more important. There are regional approaches and regions trying to aggregate demand to make market driven deployment of infrastructures economically more attractive.

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), there is also a **medium probability** of attainment. Portugal has already achieved a decent ultra-fast penetration rate (18.88 %). However, the current growth rate for ultrafast bandwidths (+12.43 %) needs a further increase in order to achieve the target by 2020. The market is not yet saturated. In Portugal there is a strong growth for new broadband connections (+3.3 percentage points in 2015). Combined with an upgrade of existing networks, it is possible to meet the take-up target by 2020, even though overall broadband take-up as of population is relatively low, amounting to 29 %, compared to an EU average of 31 % (as of total population).

Portugal has made significant progress concerning its ICT infrastructure. Currently, there is a strong infrastructure-based competition between cable and FTTP networks. As usual, this kind of competition is considerably weaker in rural areas, where both cable and FTTP networks are less available, even though the rural coverage rate for both technologies is generally relatively high (36.9 % for cable and 23.2 % for FTTP) and well above EU average. FTTP is currently being deployed by both, the incumbent and AOs. In this regard, a project that could be particularly important for the further coverage of rural areas is the extension of DStelecom's fibre network which takes place in the context of the European Commission's "Connected Communities Initiative." With the help of the European Investment Bank and the World Bank, providing financial and technical assistance, EUR 150 million are envisaged to be invested in deploying fibre in rural Portugal.

Besides regulated access to ducts, some operators made agreements to reciprocally use their respective fiber infrastructures. Given the wide availability of cable and FTTP networks, the market share of said technologies is considerably high (cable and FTTP combined account for 58 % of the market). Concerning demand, prices of broadband in Portugal are relatively high in relation to the average income

(5 % of the monthly median income for the lowest priced NGA connection). However, one has to bear in mind, that Portugal is a country where bundled services have a high importance and we compared single play offers.

The Portuguese NBP is very strategic, defining measures, objectives and indicators, thereby mostly leaving the detailed implantation to the responsible entities. There are also some organizational measures such as the creation of a monitoring committee for the Digital Agenda. Concerning supply, mobile technologies are considered as complimentary technologies and thus are briefly addressed (to be fostered via frequency release).

Regarding transparency, the NBP foresees the introduction of a centralized information system for passive infrastructure in order to ensure open access to such infrastructures. The demand side is the most specific section of the NBP. The Portuguese government intends to connect public authorities and describes the promotion of digital skills as a necessary condition for innovation and the further development towards a knowledge society. Thus, several demand driving measures are described (e.g. smart metering, simplification of e-services, increase of e-government, e-health services and start-up creation). The Digital Agenda sets measurable targets and schedules for this part of the NBP.

Overall, Portugal is one of the countries with very good perspectives concerning broadband coverage and services. Market driven deployment and competition worked well to deploy significant amounts of fibre lines throughout the country. FTTP coverage is among the highest in Europe (approx. 75 %), illustrating Portugal's remarkable broadband infrastructure. Demand is overall good, but there is still a significant number of "non-liners" and generally speaking, digital literacy could be improved. The Digital Agenda addresses these issues, but the challenge of incentivizing demand in rural areas and thus making them economically more attractive will persist. To tackle this issue without the use of substantial amounts of state aid, the regions of Portugal will be highly important. Hence, further demand aggregation, thereby convincing operators to take the risk of deploying high-end infrastructures within rural areas, should also be one of the key priorities in the future.

## 7.2.23 Romania

### Romania facts & figures

Degree of self-governance:	Unitary state (semi-presidential, representative democratic republic)
Population:	19,861,400 (3.91 % of EU) <sup>I</sup>
Population density:	86.5 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	238,391 km <sup>2</sup> (5.87 % of EU) <sup>III</sup>
Topography:	Mountain ranges in the north and central part (Carpathians), Transylvanian Plateau, lowlands in the west, south and east
Fixed BB incumbent market share:	Romtelecom: 26 % (EU average: 41 %)
NGA coverage:	72 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	13.04 EUR <sup>113</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

[Table 53 Romania facts & figures](#)

<sup>113</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.23.1 Key Features

The Romanian government has initially adopted a national strategy for the development of electronic broadband communication in Romania for the period from 2009 to 2015.<sup>114</sup> The strategy, which ran under Resolution no. 444/2009, emphasized the role of the competitive market and the fundamental principle of technological neutrality in rolling-out high speed broadband networks. Back in 2008, when the strategy was developed, Romania adopted a dynamic understanding of broadband, therewith incorporating the trend that internet bandwidth demand will increase progressively in the upcoming years.

#### National Broadband Plan of Romania: key facts

Main strategic document(s):	Government Decision HG 414/2015 (Romanian programme for the implementation of the National Plan for NGN infrastructure development) and 245/2015 (National Strategy on Digital Agenda for Romania)
Targets:	<ul style="list-style-type: none"> <li>▪ 80 % coverage with 30 Mbps by 2020</li> <li>▪ 45 % HH penetration with 100 Mbps by 2020</li> </ul>
Identical to DAE-Targets:	No (less ambitious coverage and take up targets)

Table 54 NBP Romania key facts

On the supply side, the document formulates the following broadband targets, although with no data transmission rate specifications:

- growth of the penetration rate at the level of households of broadband connection services up to 80 % by 2015,
- growth of the rate of access to electronic broadband communication services at the level of the population up to at least 100 % until 2015,
- connection and increase in the use of broadband services at the level of SMEs,
- growth of the penetration rate of electronic broadband communication services in disadvantaged areas

Action areas outlined in the old Romanian broadband strategy thereby refer to both demand stimulating measures as well as the provision of high-speed infrastructure networks. Romania's initial NBP identified a total investment sum of EUR 1.25 billion, of which around EUR 145 million were allocated to infrastructure-related works. These included co-financing infrastructure projects in market failure

<sup>114</sup> Available online (English version): [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4214](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4214)

areas (EUR 130 million), granting fiscal incentives for infrastructure projects in such areas (EUR 10 million) and developing hotspots in public spaces (EUR 5 million). The remaining EUR 1.1 billion was reserved for initiatives increasing demand such as the introduction of online services at the level of public administration, promoting ICT and connectivity of SMEs or consumer education.

In September 2014, the Romanian Ministry of Communications and Information Society has devised a document entitled “National Strategy on Digital Agenda for Romania”.<sup>115</sup> This document represents Romania’s current digital strategy. Therein four fields of action are defined, one of which is related to “broadband and digital services infrastructure”.<sup>116</sup>

- 100 % of households fixed broadband coverage,
- 80 % of households over 30 Mbps broadband coverage and
- 45 % of households subscribing to 100 Mbps.

In the attainment of the proposed objectives, Romania envisions to implement certain measures until 2018. In addition to the inventory of national telecommunications/broadband infrastructure by the National Authority for Management and Regulation in Communications (ANCOM) (imposed by Law 154/2012), the Romanian strategy involves the following measures designed to lower network roll-out costs:

- encourage access to the existing passive infrastructure,
- improve the transparency and coordination in the relevant civil works,
- simplify the authorisation procedures for the new network developments,
- set up norms regarding the NGN infrastructure for new buildings and
- improve the regulatory framework.

In the operational phase from 2016 to 2020, Romanian officials also intend to set up monitoring mechanisms and increase the involvement in research and development projects. The costs of rolling-out NGN infrastructures, according to Romania’s digital strategy, are estimated to range between EUR 3.1 and 5.5 billion (out of this, 1.1-3.5 billion for NGA infrastructure). Private investments alone will only partially cover the costs. Assuming costs to materialise at the upper level of the estimation, broadband related expenses in Romania would approximately claim a share of 80 % of the total budget allocated in the context of the National Strategy of the Digital Agenda for Romania.

---

<sup>115</sup> Available online (Rumanian version): <https://ec.europa.eu/epale/sites/epale/files/strategia-nationala-agenda-digitala-pentru-romania-20202c-20-feb.2015.pdf>

<sup>116</sup> The remaining fields of action are: 1) e-government, Interoperability, Cyber Security, Cloud-Computing, Open Data, Big Data and Social Media; 2) ICT in Education, Health, Culture and e-inclusion, and 3) e-commerce, Research & Development and Innovation in ICT



Yet another key feature of Romania's Digital Agenda is its inclusive drafting process, during which different government institutions such as the Ministry of Health, the Ministry of National Education, the Ministry of Finance and the Ministry of Transportation were consulted. Aligning interests and finding a common denominator amongst stakeholders is crucial as this measure helps with achieving cross-cutting, stable and long-term support for the national strategy.

In June 2015, Romania has adopted a follow-up NGA implementation plan by issuing Government Decision no. 414/2015.<sup>117</sup> The document represents the currently binding programme for the implementation of the Romanian NGN plan. It is embedded in the context of the Romanian Digital Strategy discussed above. In particular, Romania opts for putting priority on the development of fibre networks as close to the end user as possible. Yet, the document also qualifies high-capacity xDSL and DOCSIS technologies as adequate NGA technologies. However, "adequate levels of symmetry" and high-performance backhaul networks are emphasized. Existing wireless and mobile networks (e.g. LTE) are deemed to be important technologies towards extending overall NGN coverage in Romania. The plan also commits to transposing Directive 2014/61/EU on cost-reduction measures. In terms of investments, the NGA plan states average costs of EUR 4.6 billion. According to the Romanian NBP, about EUR 750 million will be needed to upgrade existing networks in urban areas, and EUR 1.25 billion in rural areas.

All in all, Romania's broadband development process is steered centrally. Romania commits to promoting the deployment of fibre-optic networks as a technology. Yet, especially in rural areas, the Romanian NBP underlines a mix of fixed and mobile technological solutions, notably FTTx, VDSL, 3G, HSDPA and HSDPA+. The document stresses the comparatively low purchasing power of the Romanian citizens in a European perspective, demographic changes, and relatively low levels of digitization in society as potential obstacles. Correspondingly, the NBP envisages measures to stimulate the demand for broadband services (e.g. establishment of e-government services, subsidies, cloud computing, social media, open and big data). Infrastructure-based competition is yet another aspect Romania highlights. The concurrent development and

Main Challenges for NGA roll-out in Romania:

- Shortening of permit granting process at local level advisable
- Process of EU cost reduction directive transposition is delayed
- LTE coverage is below EU average and needs further improvement
- Low purchasing power and rather low level of digital skills inhibit higher take-up

<sup>117</sup> Only available in Rumanian language

improvement of wireless networks to expand coverage is deemed an integral part of the overall broadband strategy. Funding for the NGN programme will come from the EU budget for 2014 – 2020, alongside Romanian public sector contributions via the national state budget and local budgets as well as private investments. Public funding is mostly reserved for “white areas”.

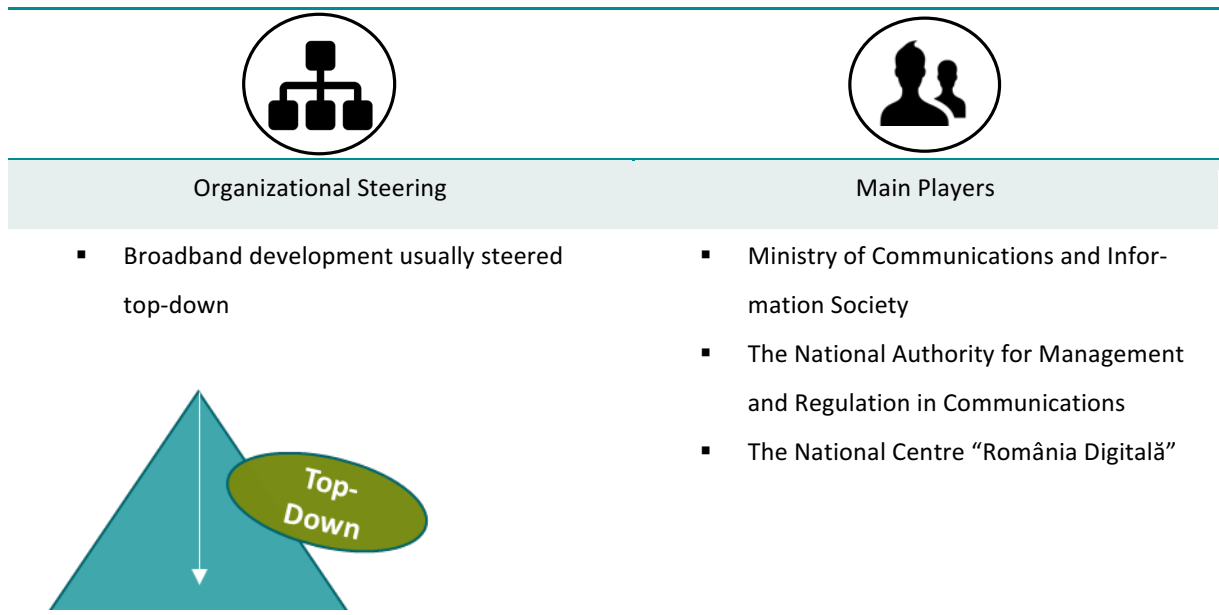


Figure 38 Organizational Steering & Main Players Romania

### 7.2.23.2 Feasibility Assessment

The achievement of Romania’s NBP targets is likely. Romania defined its national target as 80 % coverage with 30 Mbps by 2020 and 45 % household take-up with 100 Mbps or more by 2020. Romania hereby defines less ambitious targets than the DAE.

Concerning coverage, Romania has currently achieved 71.6 % NGA coverage. There is a **high probability** that Romania will meet its national target and a **medium probability** it will meet the DAE coverage target (100 % coverage with 30 Mbps by 2020). FTTP and cable networks are both well available in urban areas. FTTP coverage is even among the highest in Europe (more than 60 %). However, in rural areas in Romania, NGA connectivity is less available. In these areas only 33.2 % are covered by NGA technologies yet. Currently, this digital divide can also not be bridged by mobile networks as rural LTE coverage is at a comparably low level (34 %).

Concerning take-up, there is a similar picture. We expect that there is a **high probability** that Romania will meet its national target but “only” a **medium probability** it will meet the DAE target of 50 % of households subscribing to 100 Mbps or more by 2020. We calculated that currently 26.72 % of house-

holds subscribe to 100 Mbps or more. Most interesting, already 54 % of the existing broadband connections are FTTP. FTTP is being deployed by two operators and is an overall very well accepted technology. Combined with a decent DOCSIS cable network, there is a great potential for high-speed connectivity. However, the overall broadband penetration rate is rather low (20.5 %), leaving significant room for new connections. While future-proof technologies are widely available for connectivity throughout Romania, the demand could be stronger. There are different reasons for this: First, ICT services are not part of the daily life of many Romanians. The number of “non-liners” is still very high and about one quarter of the population has never used the internet before (27.86 %). Furthermore, affordability is an issue. Romanians pay 7 % of the monthly median income for the lowest priced NGA subscription, which is one of the highest values in Europe.

The NBP of Romania is very operational and tries to tackle the remaining issues. It includes a variety of measures underpinned with responsibilities for implementation, schedules, indicators and monitoring procedures. Despite its overall centralised approach, Romania involves ICT stakeholders for public consultations and strategy development. There is a monitoring procedure for the NBP’s implementation. Concerning the supply side, there is a major use of state aid discernible (the most important project (RONET) connect more than 700 localities via middle mile funding. PPP models are an important mode of investment and local authorities are part of these investments. According to the NBP, symmetric fibre-based technologies should be preferred for deployment. To further bring down the cost of deployment, the NBP also defines several measures to increase transparency (e.g. a central infrastructure register, service mapping, simplification of permit granting or rules for in-house-wiring). Whilst the transposition of the cost reduction directive was delayed initially, a new law was adopted in 2016, thereby completing the transposition. Concerning the demand side, the described measures include tax deductions, subsidies for end users’ equipment, open data, e-government and several others.

Overall, the Romanian NBP is comprehensive and largely addresses the most pressing topics. However, the most prominent problem of affordability still constitutes a major challenge. Despite the state aid investments, further incentives for investments in commercially not viable rural areas including potential simplifications of the complex permit granting procedures at local level will be crucial for Romania’s broadband development. Additionally, further demand side measures to compensate for the extraordinary high prices (in relation to the median income) will be necessary. However, the Romanian fibre infrastructure is one of the leading ones in Europe. Chances are that with further economic development in Romania, NGA coverage and take-up will increase likewise and will bring Romania close to fulfilling the DAE targets as well as its own.

## 7.2.24 Slovakia

### Slovakia facts & figures

Degree of self-governance:	Unitary state (parliamentary democratic republic)
Population:	5,421,349 (1.07 % of EU) <sup>I</sup>
Population density:	110.5 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	49,035 km <sup>2</sup> (1.21 % of EU) <sup>III</sup>
Topography:	Largely mountainous (Tatra Mountains in the north), flat terrain in the south
Fixed BB incumbent market share:	Slovak Telekom: 35 % (EU average: 41 %)
NGA coverage:	67 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	17.23 EUR <sup>118</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 55 Slovakia facts & figures

<sup>118</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.24.1 Key Features

Slovakia’s initial National Broadband Plan was published under the title “National Strategy for Broadband Access in the Slovak Republic.”<sup>119</sup> The Slovakian broadband targets are in line with the DAE (100 % coverage with 30 Mbps until 2020, 50 % take-up rate for 100 Mbps).

In 2014, the initial NBP has been amended by the “Strategic document for Digital Growth and Next Generation Access Infrastructure 2014 – 2020.”<sup>120</sup>

#### National Broadband Plan of Slovakia: key facts

Main strategic document(s):	Strategic document for Digital Growth and Next Generation Access Infrastructure 2014 – 2020 (including the new government notes)
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> </ul>
Identical to DAE-Targets:	No, only identical concerning the coverage target

Table 56 NBP Slovakia key facts

The basic framework to be considered in the deployment and use of broadband is to meet the Digital Agenda target of 100 % coverage with 30 Mbps high-speed internet and the preparation for meeting the target concerning the subscriptions of high-speed internet above 100 Mbps. The long-term target of ensuring that 50 % of households have access to broadband with speed above 100 Mbps by 2020 was not incorporated in Slovakia’s National Broadband Strategy, largely on grounds that its accomplishment cannot be guaranteed.<sup>121</sup>

Therein, Slovakia formulates six strategic objectives towards cultivating e-government services, improving the functioning of an information society and establishing a “Smart Government”. These include:

- moving towards electronic services to improve the quality of life,
- moving towards electronic services to boost competitiveness,
- constant improvements in services in using modern technologies,

<sup>119</sup> Available online (English version): [http://www.telecom.gov.sk/index/open\\_file.php?file=telekom/Strategia/Broadband/NSSP\\_2011\\_en.pdf&lang=en](http://www.telecom.gov.sk/index/open_file.php?file=telekom/Strategia/Broadband/NSSP_2011_en.pdf&lang=en) and the new version, including the new government notes on January 2016: <http://www.rokovania.sk/Rokovanie.aspx/BodRokovaniaDetail?idMaterial=23177>

<sup>120</sup> Available online (English version): [http://www.informatizacia.sk/ext\\_dok-strategicky\\_dokument\\_2014\\_2020\\_en/16622c](http://www.informatizacia.sk/ext_dok-strategicky_dokument_2014_2020_en/16622c)

<sup>121</sup> <http://www.rokovania.sk/Rokovanie.aspx/BodRokovaniaDetail?idMaterial=23177>

- creating a secure environment for citizens, businesses and public administration,
- bringing public administration closer to the maximum use of data in customer-driven processes,
- optimum use of information technologies in public administration through a shared services platform.

As a possibility of state intervention, Slovakia's NBP discusses defining broadband as part of a universal service obligation. EU funding and private investments are described as the main source of funds that can be used for broadband deployment. In particular, Slovakia's NBP estimates that about EUR 161.5 million should come from the EU's structural funds, co-financed by EUR 28.5 million from state budget. Furthermore, EUR 1.7 billion of private investments are expected. Planned financing for broadband development according to the NBP thus totals EUR 1.89 billion. In its NBP, Slovakia commits to introduce legislative changes which *inter alia* aim at complying with provisions of the EU's Cost-Reduction Directive. Relatedly, the implementation of a central atlas mapping existing passive infrastructure was announced to begin in 2014. Until 2015, there was a major state aid measure in place to achieve the construction of a national backhaul network. The establishment of a public-sector-only wireless network is part of a discussion as well.

Main Challenges for NGA roll-out in Slovakia:

- Allow for stronger involvement of local and regional actors
- Incentivize the private sector to cover the last mile regarding the current funding of (middle mile) regional networks
- Avoid delays within publicly financed projects
- Decrease of the digital divide
- Further increase of fixed and mobile broadband take-up needed

Slovakia's NBP is supposed to be reviewed again in mid-2018. Overall, Slovakia emphasises that network deployment should be funded by private sources. Mobile technologies are viewed as an important element in providing nation-wide coverage. There are no regional broadband plans available in the Slovak Republic.

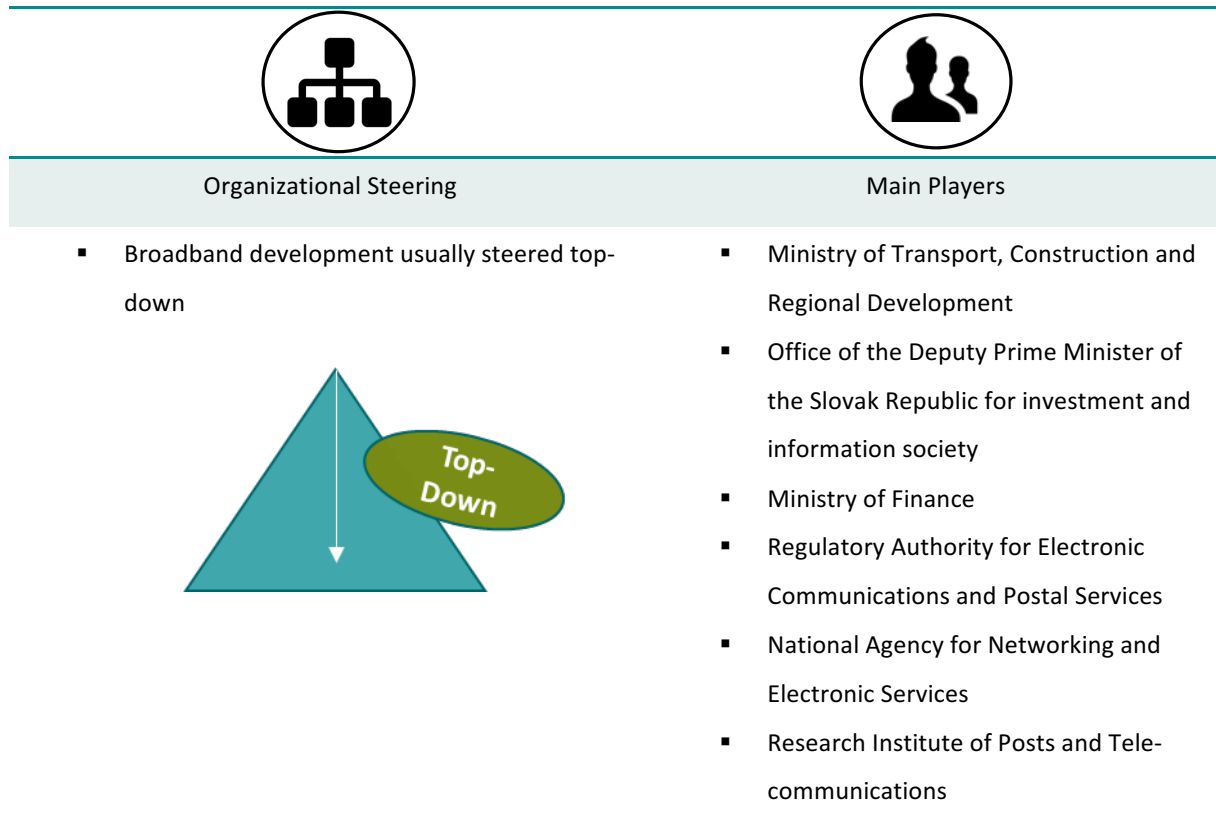


Figure 39 Organizational Steering & Main Players Slovakia

#### 7.2.24.2 Feasibility Assessment

The achievement of Slovakia’s NBP’s targets will be difficult. Concerning the coverage target (100 % coverage with 30 Mbps by 2020), we expect a **low probability** of achievement. Currently, there is an NGA coverage rate of 67.1 %, which is slightly below EU average (70.9%). However, the rural NGA coverage is significantly lower. Currently, 14.1 % of the rural population are able to subscribe to 30 Mbps or more. This digital divide is severe and will be difficult to close by 2020. LTE is not a suitable substitute for this lack of rural NGA networks, as rural coverage is at 9 %. However, WLAN providers are an important substitute for the rural population. Although usually not NGA networks, these technologies compete with ADSL, while within urban areas, there is an infrastructure-based competition between cable operators (present in roughly half of the urban areas) and the incumbent as well as AOs mainly deploying FTTH (usually P2P).

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), there is again a **low probability** of achieving the targets. We calculated that currently 6.7 % of households fulfil this criterion and subscribe to ultrafast connections. Furthermore, fixed broadband penetration in Slovakia is currently at 22.7 %, well below EU average (31.6 %). Considering the growth rate of 1.3 %, the chance that new fixed connections will be sufficient to achieve the target is thus rather low.

However, the demand for ultrafast connections is at least substantially growing (currently +11.92 %). Nonetheless, the number of new connections and upgrades of existing connections would have to rise significantly to achieve the target. The reasons for relatively low take-up seem to be manifold. While prices are at European average (3 % of the monthly median income for the lowest priced NGA connection), broadband take-up clearly stays behind. The relatively high unemployment rate (>12 %) might be one aspect which decreases affordability. Overall, the low fixed and mobile broadband penetration rate reveal that demand seems to be relatively low. However, in the case of Slovakia, the shortage of supply might also negatively impact the demand.

The Slovakian NBP is a very operational and comprehensive document. It describes several measures underpinned by a definition of responsibilities, a schedule for implementation, indicators to measure progress and monitoring procedures. For all “priority actions” there are quantitative indicators. Concerning the overall strategic approach, Slovakia defines a level playing field as an important factor in favour of digital infrastructure development. In practice, the importance of regulatory action is demonstrated by strict access obligations for the incumbent’s infrastructures. Concerning the supply side, the Slovakian NBP identifies the issue of a substantial digital divide. The NBP outlines different possibilities of public intervention (e.g. PPP models, development of regional networks). The use of EU-funds is an important aspect of financing such projects, although of course private investment is prioritized. To incentivize such private investment, there are several measures to increase transparency and hereby costs of deployment. The most striking measure is the establishment of an atlas for passive infrastructure, planned to be completed in 2018. Otherwise, there are efforts to transpose the cost reduction directive to full extent, including in-house wiring. Concerning the struggling demand side, the NBP defines some measures including the connectivity of centres of education (e.g. schools/libraries) and programmes designed to increase the affordability of services (especially for disadvantaged groups). E-Government services are another field of intervention where the government aims to incentivize demand.

Overall, Slovakia has already undertaken major efforts and identified the most pressing issues. Even though rural areas are lagging behind in terms of high-end digital infrastructures, ADSL and WLAN providers offer a basic and reliable connectivity that currently still serves an important purpose while more sustainable technologies are already being deployed in many areas. Due to the very fragmented operators market, the opportunities for economies of scale and large-scale deployment are currently limited. However, the competitive environment incentivizes several operators to invest in cable and FTTB/FTTH solutions which will cover a large part of Slovakia in the foreseeable future. Generally, the



current measures concerning the demand and supply side will provide for substantial progress in the future, despite the circumstance that the DAE targets might not be met entirely.

## 7.2.25 Slovenia

### Slovenia facts & figures

Degree of self-governance:	Unitary state (parliamentary representative democratic republic)
Population:	2,062,874 (0.41 % of EU) <sup>I</sup>
Population density:	102.4 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	20,273 km <sup>2</sup> (0.50 % of EU) <sup>III</sup>
Topography:	Largely mountain ranges (Alps), lowlands in the east (Pannonian Basin)
Fixed BB incumbent market share:	Telekom Slovenije: 34 % (EU average: 41 %)
NGA coverage:	79 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	30.74 EUR <sup>122</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 57 Slovenia facts & figures

<sup>122</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.25.1 Key Features

Slovenia's initial broadband strategy was launched in 2008 under the title "Strategija Razvoja Širokopasovnih Omrežij V Republiki Sloveniji" ("Broadband Network Development Strategy in the Republic of Slovenia").<sup>123</sup> Slovenia's initial NBP is not in line with the DAE targets, as its broadband targets are slightly below the DAE requirements, with a 90 % coverage with 30 Mbps instead of a 100 % coverage to be reached by 2020. Furthermore, take-up rates of higher bandwidths are not addressed within the national strategy.

<b>National Broadband Plan of Slovenia: key facts</b>	
Main strategic document(s):	Plan for the development of next-generation broadband networks until 2020 (updated in March 2016)
Targets:	<ul style="list-style-type: none"> <li>▪ 96 % coverage with 100 Mbps by 2020</li> <li>▪ 100 % coverage with 30 Mbps by 2020</li> </ul>
Identical to DAE-Targets:	No (more ambitious coverage target)

Table 58 NBP Slovenia key facts

The strategy describes FTTH or technologies "with similar capabilities" as the preferred choice for deployment. There are no regional broadband plans available. In terms of funding, the Slovenian NBP allocated about EUR 91 million (excluding EU funds) for the period of 2007 to 2013. There are no specific budgetary estimations for the present period included in Slovenia's broadband strategy.

In 2015, Slovenia issued a new broadband strategy that runs until 2020: the "plan for the development of next-generation broadband networks until 2020". The plan was updated in early March 2016.<sup>124</sup> Slovenia's currently binding broadband targets envision that 96 % of households should be equipped with broadband internet access speeds of at least 100 Mbps by 2020, and the remaining 4 % with broadband internet access speeds of at least 30 Mbps. The plan follows the EU 2020 strategy and the Digital Agenda. In this context, it sets strategic objectives in the field of broadband infrastructure and the strategic basis for the use of funds from the European Regional Development Fund and the European Agricultural Fund for Rural Development.

<sup>123</sup> Available online (Slovenian version): [http://ec.europa.eu/information\\_society/newsroom/cf/dae/document.cfm?doc\\_id=4863](http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=4863)

<sup>124</sup> [http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Informacijska\\_druzba/NGN\\_2020.pdf](http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Informacijska_druzba/NGN_2020.pdf)

According to the “plan for the development of next generation broadband networks until 2020”, the planned investment for developing broadband networks for high-speed access are EUR 365 million.<sup>125</sup>

Overall, Slovenia opts for market dynamics in developing broadband networks, in particular infrastructure- and service-based competition. Towards an increasing demand, the Slovenian NBP highlights the role of e-government, e-health, e-education and e-business services. Satellite technology is viewed as a viable approach towards increasing broadband coverage, especially in remote and less accessible areas. Mobile and wireless solutions are a comple-

ment for fixed broadband networks as well. Infrastructure deployment in white spots will be financed by EU funds and the state budget. Local and regional actors are encouraged to launch roll-out projects, assist in financing, establish public-private partnerships or contemplate other business models. The NBP also invites local governments to adjust administrative procedures, for instance towards issuing permits, administrative processes and the provision of passive public utility infrastructure.

**Main Challenges for NGA roll-out in Slovenia:**

- Relatively low take-up rate considering the high availability of NGA networks
- Digital literacy needs improvement
- Increase of mobile broadband penetration rate needed
- Dispersed settlement structures in rural areas increase the costs of construction of broadband infrastructure
- Identification of a take-up target can increase measurability of success

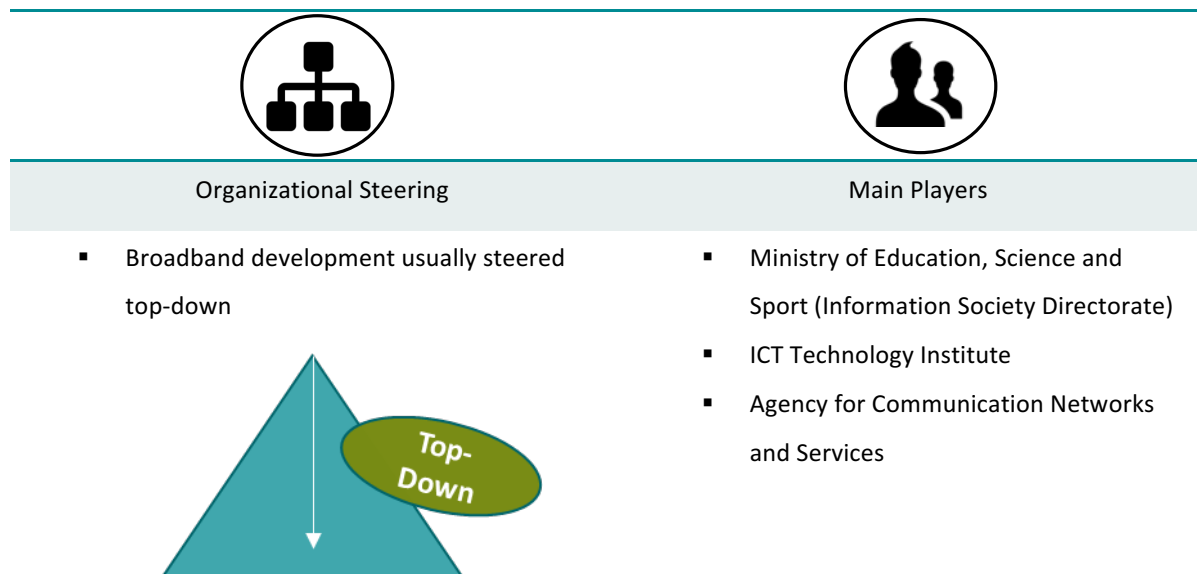


Figure 40 Organizational Steering & Main Players Slovenia

<sup>125</sup> [http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Informacijska\\_druzba/NGN\\_2020.pdf](http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Informacijska_druzba/NGN_2020.pdf)

### 7.2.25.2 Feasibility Assessment

The achievement of Slovenia's NBP's targets is rather challenging. Slovenia defined its national target as 96 % coverage with 100 Mbps by 2020. We expect a **low-medium probability** that this target will be met. The reasons for our estimations are the same concerning the DAE coverage target (100 % coverage with 30 Mbps by 2020), where we also expect only a **low-medium probability** of achievement. Most importantly, the current NGA coverage in Slovenia is 78.8 %, which is by itself a decent coverage rate and above EU average. However, there is a significant digital divide: in rural areas, the coverage rate is at 62.4 %. Again, in EU comparison, the rural coverage is at a relatively high level. However, as roughly 50 % of Slovenia's population live in rural areas, bridging this gap quickly will be cumbersome. Especially considering the high rural LTE coverage rate of 97 %, there are some doubts concerning the further deployment of fixed NGA networks in rural areas as there is already a substitute available. However, there are lots of positive signs concerning overall development of (fixed) digital infrastructures in Slovenia. Cable and other alternative providers were first movers within the NGA market and offer high quality cable and FTTH connections, thus pressuring the incumbent to also invest in FTTH technology to keep up with the competition. By now, cable and FTTB/FTTH have an impressive combined market share of 54 %, indicating that these technologies are the main source of connectivity in Slovenia.

Concerning the DAE take-up target (50 % of households subscribing to 100 Mbps or more by 2020), there is also a **low-medium probability** that the target can be met. We calculated that currently 4.91 % of Slovenian households subscribe to such ultrafast connections. The fixed broadband penetration rate across Slovenia is at 28 % and has a rather slow growth rate of 0.7 %. New connections will thus be not sufficient to achieve the 50 % take-up rate by 2020. Concerning further upgrades of existing connections, Slovenia is in a better position. The growth rate for ultrafast-connections are currently at 69.24 %, which would (in case this strong growth continues) bring Slovenia close to the target. Aspects that inhibit higher take-up seem to be affordability (Slovenians pay roughly 3 % of the median income for the lowest priced NGA connection and triple-play bundles are dominant) and digital literacy. Especially the rate of "non-liners" is relatively high and thus negatively affecting demand.

The Slovenian NBP is a very comprehensive and operational document. The NBP defines clear responsibilities, indicators, monitoring procedures and schedules. The NBP stresses the importance of a regulatory and legislative environment that incentivizes broadband development. An annual evaluation shall discover if the measures are contributing to the targets. Concerning the supply side, Slovenia uses mainly ESIF funds to provide for future-proof technologies in areas of market failure. Public Private Partnership models are also part of the NBP and realized at local level, involving municipalities. The

Slovenian authorities describe rural areas as the priorities of intervention, while urban areas are mainly developed by market forces. The Slovenian NBP also defines several measures to decrease costs for deployment via an increase in joint construction and co-use of existing infrastructures. For example, the transposition of the cost reduction directive is a central aspect of transparency related measures defined within the NBP. Furthermore, the setting up of a public infrastructure cadastre is one measure of the plan. Concerning the demand side, there is still room for improvement as the number and scope of measures could still be extended. One positive example, however, is the obligation for PPP projects to provide free WLAN with at least time-limited access.

Overall, Slovenia's situation is much better than what the estimations would suggest: although we expect Slovenia to fail both the DAE as well as its own national target, the overall development of digital infrastructures is very positive. There is a high market share of cable and FTTB/FTTH connections provided by several providers within a competitive environment. Future measures should focus on publicly funded projects within rural areas and further demand stimulation.

## 7.2.26 Spain

### Spain facts & figures

Degree of self-governance:	Unitary state (Constitutional monarchy)
Population:	46,439,900 (9.14 % of EU) <sup>I</sup>
Population density:	92.5 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	505,944 km <sup>2</sup> (12.46 % of EU) <sup>III</sup>
Topography:	Inner plateau, mountain ranges in the north (Pyrenees), lowlands in the southwest, north and coastal plains, Balearic and Canary Islands
Fixed BB incumbent market share:	Telefónica (Movistar): 44 % (EU average: 41 %)
NGA coverage:	77 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	40.21 EUR <sup>126</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 59 Spain facts & figures

<sup>126</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.26.1 Key Features

In 2013, the Spanish Government adopted the Agenda Digital para España (Digital Agenda for Spain, ADpE),<sup>127</sup> setting out a comprehensive national ICT strategy to meet the DAE objectives.

One of the goals of the ADpE is to promote the deployment of (ultra-fast) networks and an efficient radio spectrum management by setting up a regulatory framework that guarantees certainty and prevents the introduction of unnecessary barriers. Furthermore, the strategy intends to increase the demand for digital

services and to promote the production and distribution of digital content over the Internet by improving the experience of broadband service for users.

The ADpE is developed by several specific plans (10 so far), including a Telecommunications and Ultrafast Networks Plan<sup>128</sup> (UN Plan), which contains the blueprint of the country's national broadband strategy. Seven indicators contribute to the monitoring of the implementation of the UN Plan. A first report on the implementation of the UN Plan (Informe de seguimiento) was published in November 2014.<sup>129</sup>

The UN Plan contains measures to foster ultrafast fixed access networks (regulatory measures to reduce roll out cost, better use of existing infrastructure and coordination with other administrations), foster ultrafast mobile access networks (accelerating 4G deployment thanks to new spectrum, simplifying roll out requirements and universal access to ultrafast mobile broadband (30 Mbps) in centres with less than 5000 inhabitants) and support take-up. In this regard, the objectives of the DAE are reiterated (100 % coverage with 30 Mbps and 50 % take-up with 100 Mbps until 2020). 4G coverage

### National Broadband Plan of Spain: key facts

Main strategic document(s):	Spanish Digital Agenda - Telecommunications and Ultrafast Networks Plan and implementation reports
Targets:	<ul style="list-style-type: none"> <li>▪ 100 % coverage with 30 Mbps by 2020</li> <li>▪ 50 % HH penetration with 100 Mbps by 2020</li> </ul>
Identical to DAE-Targets:	Yes

Table 60 NBP Spain key facts

<sup>127</sup> Available online (English version): <http://www.agendadigital.gob.es/digital-agenda/Documents/digital-agenda-for-spain.pdf>

<sup>128</sup> [http://www.agendadigital.gob.es/planes-actuaciones/Bibliotecatelecomunicaciones/Detalle%20del%20Plan/Plan-ADpE-1\\_Redres-Ultras-rapidas.pdf](http://www.agendadigital.gob.es/planes-actuaciones/Bibliotecatelecomunicaciones/Detalle%20del%20Plan/Plan-ADpE-1_Redres-Ultras-rapidas.pdf)

<sup>129</sup> [http://www.agendadigital.gob.es/planes-actuaciones/Bibliotecatelecomunicaciones/Material%20complementario/ADPE-Situacion\\_Plan\\_1-3Q2014.pdf](http://www.agendadigital.gob.es/planes-actuaciones/Bibliotecatelecomunicaciones/Material%20complementario/ADPE-Situacion_Plan_1-3Q2014.pdf)



should reach 75% of the population by 2015. In 2015, a first implementation report on the ADpE was published.<sup>130</sup>

In May 2014, the main legislative measure provided for in the ADpE was completed, with the adoption of the Telecommunications Law (9/2014), replacing Law 32/2003. Furthermore, the Plan contains measures to facilitate the access of operators to new spectrum bands, simplify network deployment (for instance by introducing deployment standards and lowering administrative burdens), reduce deployment costs (see below) and support demand.

In regions where market-based deployment fails due to a lack of profitability, the Spanish UN Plan also foresees to financially support the deployment of broadband networks (access networks of 100 Mbps or more, extension of backhaul supporting at NGA networks, and access networks of 30 Mbps or more).

In addition to the national Digital Agenda, at regional level, various regions (Comunidades Autónomas - CCAA) have developed their own projects, programmes and strategies for overall digital development and broadband roll-out, thereby, apart from their own financial resources and private sector investments, often also relying on European funds. Generally, the different regional strategies share many commonalities and also usually refer to the Spanish or European agenda as being a reference framework, but they also show some differences regarding their scope and emphasis. Some regions have developed comprehensive and detailed digital agendas (e.g. Galicia<sup>131</sup>, the Valencian Community<sup>132</sup> or the Basque Country<sup>133</sup>), whereas others seem to renounce all-embracing concepts and rely more on individual measures and projects and/or embed their approach in overall growth programs and strategies such as Operational Programmes or Smart Specialisation Strategies in the context of EU-funds (e.g. Aragón<sup>134</sup> or Castilla y León<sup>135</sup>). While most regional strategies reiterate the Spanish/European

---

<sup>130</sup> <http://www.agendadigital.gob.es/Seguimiento/Informesanuales/Informes/informe-agenda-digital-espana.pdf>

<sup>131</sup> <http://amtega.xunta.gal/./axenda-dixital-de-galicia-2020.pdf>

<sup>132</sup> <http://www.agendadigital.gva.es/documents/128745511/128746769/AgendaDigitalCV.pdf/2f6188e7-50de-4cf3-9ebf-9d781b280198>

<sup>133</sup> [http://www.euskadi.eus/contenidos/plan\\_departamental/xleg\\_plandep\\_46/es\\_def/adjuntos/Agenda%20Digital%20de%20Euskadi%202020.pdf](http://www.euskadi.eus/contenidos/plan_departamental/xleg_plandep_46/es_def/adjuntos/Agenda%20Digital%20de%20Euskadi%202020.pdf)

<sup>134</sup> [http://www.aragon.es/DepartamentosOrganismosPublicos/Departamentos/InnovacionInvestigacionUniversidad/AreasTematicas/Telecomunicaciones/ci.pag\\_10\\_conectararagon.detalleDepartamento?channelSelected=0](http://www.aragon.es/DepartamentosOrganismosPublicos/Departamentos/InnovacionInvestigacionUniversidad/AreasTematicas/Telecomunicaciones/ci.pag_10_conectararagon.detalleDepartamento?channelSelected=0)

<sup>135</sup> [http://www.jcyl.es/junta/cp/Memoria\\_RIS3\\_20140630.pdf](http://www.jcyl.es/junta/cp/Memoria_RIS3_20140630.pdf)

coverage and penetration targets, some regions have also set their own, usually more ambitious targets. Catalonia<sup>136</sup>, for example, aims for a penetration rate of 75 % and envisions 100 % coverage (both with 100 Mbps and until 2020) while the Basque country introduced the specific target of 100 % coverage with 100 Mbps in all industrial zones in the same time frame. Moreover, many strategies are somewhat similar in the sense that they clearly put their emphasis on demand side

Main Challenges for NGA roll-out in Spain:

- Balancing investment and competition in the transition towards FTTP networks
- Further enhancement of coordination between national and regional/local administrations is advisable
- Dominance of xDSL despite strong growth of FTTP-networks
- Disparities between regions and between regional and urban areas
- Need to foster NGA take-up

measures (e.g. regarding digital skills, digital administration or the IT-sector in general), thereby also addressing regional peculiarities (e.g. the Galician plan attaches specific importance to digitisation in the primary sector). Nonetheless, infrastructure roll-out usually constitutes a core element of regional strategies and many regions have established programmes and projects in this context, with the emphasis usually being to connect public buildings, industrial zones or rural areas, whereby the specific focus again depends on the respective region (e.g. Galicia focuses more on rural areas whereas Catalonia or the Basque Country focus more on industrialized zones). In this regard, Andalusia<sup>137</sup> and Galicia<sup>138</sup> can be regarded as outstanding examples as they developed comprehensive separate plans dedicated exclusively to broadband infrastructure roll-out, complementing their overall digital agenda. While most other regional plans attach less importance to infrastructure roll-out or remain rather vague, the Andalusian and Galician governments produced thorough roll-out plans providing a detailed analysis of the status quo and a comprehensive strategy regarding specific objectives, legislative and regulative measures, funding, monitoring mechanisms and the establishment of specific bodies and entities.

---

<sup>136</sup> [http://www.idigital.cat/documents/10501/405750/Agenda\\_Digital\\_CAT\\_maquetada.pdf](http://www.idigital.cat/documents/10501/405750/Agenda_Digital_CAT_maquetada.pdf)

<sup>137</sup> [http://www.juntadeandalucia.es/export/drupaljda/ESITA\\_2020.pdf](http://www.juntadeandalucia.es/export/drupaljda/ESITA_2020.pdf)

<sup>138</sup> [https://amtega.xunta.gal/sites/default/files/plan-de-banda-larga-de-galicia-2020\\_0.pdf](https://amtega.xunta.gal/sites/default/files/plan-de-banda-larga-de-galicia-2020_0.pdf)

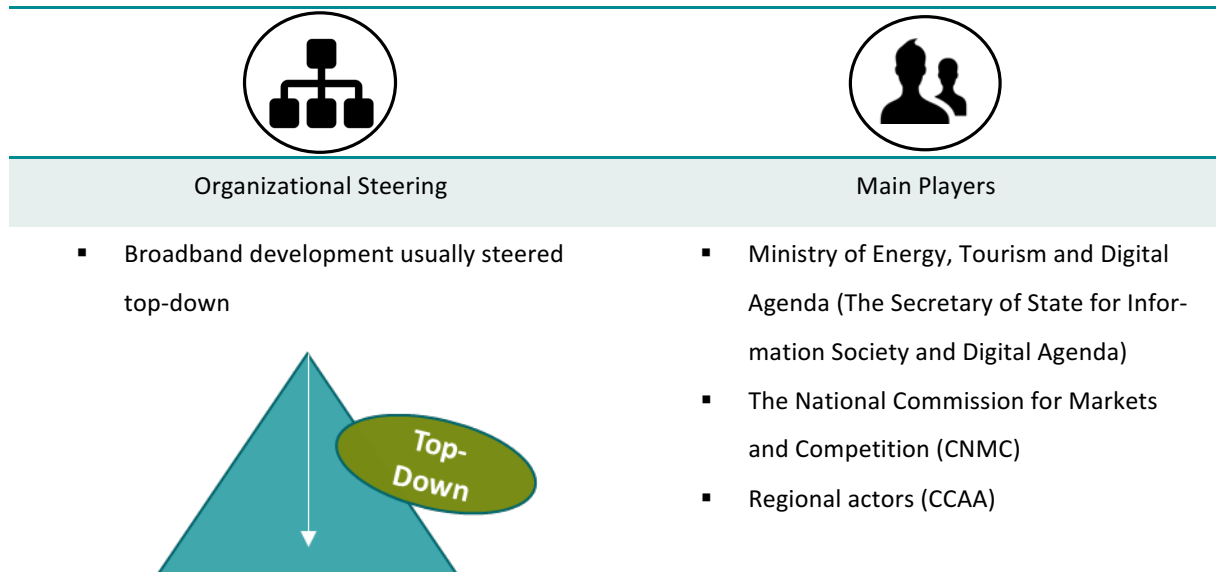


Figure 41 Organizational Steering & Main Players Spain

#### 7.2.26.2 Feasibility Assessment

Spain has shown tremendous efforts regarding the update of its telecommunications networks during the last years and thus has already a decent NGA infrastructure at its disposal. Especially FTTP coverage is significantly above European average (52.8 % in Spain vs. 21 % in the EU), ranking Spain within the top group in Europe. Reaching full NGA coverage (100 % with 30 Mbps), however, still remains a major challenge, at least within the time frame of 2020. Hence, a **low-medium probability** for reaching DAE target II is presumed. NGA coverage is currently 77 % (24 % in rural areas). Considering this digital divide and the current demographic developments, making rural areas economically even less interesting for internet service providers, reaching countrywide coverage will be difficult<sup>139</sup>. However, both FTTH/B and cable networks are currently strongly expanding, which will lead to a further increase of overall NGA coverage in the future.

For the second target (50 % of the households have subscriptions of 100 Mbps or higher), we conclude that there is a **medium** probability to meet the target. There are several premises that lead to this conclusion: the overall availability of NGA networks is good (especially in urban areas) and take-up of ultra-fast speeds is already at an above-average level (currently calculated as 9.76 % of households subscribing to 100 Mbps or more). Furthermore, there is a strong growth for ultra-fast speeds (2014-2015: 69.98 %). If this trend continues, the DAE take-up target can be met. However, concerning higher take-up rates, affordability may become an obstacle at some point. In Spain, triple (or quadruple) play

<sup>139</sup> As in all other countries, potential 30 Mbit/s downstream coverage via satellite and mobile connections as shared mediums are not considered within the analysis.

bundling is very common, the lowest price for standalone NGA subscriptions is therefore relatively high (4 % of the median income, above EU average). As a positive aspect, FTTB/H often comes within the said bundles at no premium, which leads to a high FTTB/FTTH market share. However, stronger competition might help to tackle the overall existing issue of affordability.

Several landmark decisions by the Spanish NRA have already contributed to an increase in competition and thus decrease in prices, leading also to the strongest growth in fibre deployment (17.7 % in 2015) in the EU. In 2008, the incumbent Telefónica was obliged to offer access to its ducts and only one year later, a symmetrical obligation to provide access to in-house fibre cabling was imposed upon all operators. Moreover, several agreements on co-investment and co-deployment of fibre were signed in 2012/2013 and cable operators upgraded their networks to DOCSIS 3.0 in recent years, which further contributed to the growth of FTTP networks.<sup>140</sup> In February 2016, CNMC further completed its review of wholesale broadband markets<sup>141</sup> and imposed on Telefónica (incumbent) the obligation to offer other operators access to its FTTH networks via virtual unbundling: 66 locations across Spain (roughly 35% of the territory), however, will be exempted from this rule as they were already classified as “competitive regions”. Telefonica reacted to the NRA’s decision by announcing a reduction of its planned investments in broadband expansion by 20 % and a future focus on regions exempted from the decision. Hence, despite the overall positive nature of the decision, possibly leading to further competition and fibre deployment, its overall impact on the Spanish telecommunications market remains yet uncertain.

Overall, despite the fact that the DAE targets might not be met entirely, Spain is very well on track with its current NBP. NGA coverage as well as take-up of ultrafast connections is already relatively high and especially futureproof solutions such as FTTP and cable are expanding and growing fast. Spain’s NBP is very comprehensive and operational, including various well-defined measures, responsibilities and indicators to monitor progress. Spain defined different supply side measures (e.g. grants and loans) to foster supply, which already had a significantly positive effect. Worth noticing is the fact that AOs receive significantly higher shares of state aid in relation to their market share than the incumbent. The demand side of the Spanish NBP is also well-defined. The various measures foreseen (e.g. plans for e-commerce, e-government action plans, digital ecosystem confidence plan) are expected to have a positive impact on take-up as well as coverage.

---

<sup>140</sup> [http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc\\_id=15401](http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=15401)

<sup>141</sup> <https://www.cnmc.es/CNMC/Prensa/TabId/254/ArtMID/6629/ArticleID/1650/La-CNMC-aprueba-la-regulaci243n-mayorista-de-los-mercados-de-banda-ancha.aspx>

Next to the NBP of Spain, there are also several regional broadband strategies and digital agendas with differing measures. While the most pressing issues will have to be solved at national level, regional and local actors will continue to play an important role. There are several projects driven by regional and local actors that currently gain momentum which could contribute to bridging the digital divide in Spain and achieving the NBP's targets. Whilst Spain has already recognized the importance of regional and local actors by introducing several important coordination mechanisms (especially regarding state aid), there still seems to be some yet unexploited potential at regional and local level. By enhancing coordination and cooperation between the federal and regional level even more (e.g. via additional cooperation agreements) and increasing support for local actors and operators, which in some cases lack the necessary resources, important local small-scale projects could be fostered, thereby creating synergies and making a valuable contribution to narrow the digital divide. Here, the Spanish BCO initiative might help, which is well ahead in European comparison. In this regard, also the creation of a centrally administrated infrastructure register should at least be considered. While the incumbent currently provides an infrastructure database in the context of a reference offer for access to its infrastructure (MARCo), a centrally administrated infrastructure register would offer even more potential, especially regarding co-deployment and alternative methods of deployment, which could prove to be particularly beneficial in the context of the above mentioned local small-scale projects.

## 7.2.27 Sweden

### Sweden facts & figures

Degree of self-governance:	Unitary state (Constitutional monarchy)
Population:	9,747,355 (1.92 % of EU) <sup>I</sup>
Population density:	23.8 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	438,574 km <sup>2</sup> (10.8 % of EU) <sup>III</sup>
Topography:	Coastal lowlands in the east and south, mountain ranges in the west
Fixed BB incumbent market share:	Telia Sonera: 36 % (EU average: 41 %)
NGA coverage:	76 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	15.64 EUR <sup>142</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 61 Sweden facts & figures

<sup>142</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

### 7.2.27.1 Key Features

Sweden has a role model status in Europe as it has had a broadband policy ever since the late 1990s. The country's overall objective is accordingly ambitious, namely to obtain "world-class broadband". The national strategy document is entitled "Broadband Strategy for Sweden" and was drafted in November 2009.<sup>144</sup> The Swedish Broadband Strategy is embedded into the overarching Swedish Digital Agenda ("IT i Människans Tjänst - en digital agenda för Sverige").<sup>145</sup>

Sweden's long term objective is to achieve 90 % coverage with 100 Mbps until 2020. An additional mid-term goal to be achieved by 2015 was that 40 % of

all households and businesses should

have access to internet at a minimum speed of 100 Mbps. By the end of 2014, Sweden had already met its interim goal with a broadband coverage level (> 100 Mbps) of 57.5 % according to the IHS and VVA Broadband Coverage study.

Sweden's broadband objectives evidently surpass the DAE broadband targets. In realising network deployment, the country emphasizes the role of private capital and the market in making investments in the network infrastructure. The Swedish government's role is confined to the provision of a conducive regulatory and market environment. Furthermore, Sweden has launched a broadband forum to enable exchange and collaboration in the area of broadband development.

### National Broadband Plan of Sweden: key facts

Main strategic document(s):	Broadband Strategy for Sweden - Swedish Digital Agenda (IT i Människans Tjänst - en digital agenda för Sverige) / <i>Updated version: Sweden fully connected 2025</i> - <i>A broadband strategy (Sverige helt uppkopplat 2025 - en bredbandsstrategi)</i> <sup>143</sup>
Targets:	<ul style="list-style-type: none"> <li>90 % coverage with 100 Mbps by 2020 (95 % in the current NBP)</li> </ul>

Identical to DAE-Targets:	No (more ambitious coverage target)
---------------------------	-------------------------------------

Table 62 NBP Sweden key facts

<sup>143</sup> Very recently (December 2016) Sweden adopted an update of its NBP. Whilst it is already directed towards the year 2025 (the target is to achieve 98 % coverage with 1 Gbps, 99.9 % with 100 Mbps and at least 30 Mbps for the remaining 0.1 % by 2025), it also contains a slight raise of the coverage target set out in the NBP this study is based on (from 90 % to 95 % with 100 Mbps until 2020). See (Swedish version): <http://www.regeringen.se/4b00e7/contentassets/a1a50c6a306544e28ebaf4f4aa29a74e/sverige-helt-uppkopplat-2025-slutlig.pdf>

<sup>144</sup> Available online (English version): [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4861](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4861)

<sup>145</sup> Available online (Swedish version): URL: <http://www.regeringen.se/rapporter/2011/10/n2011.12>

Overall, the Swedish Post and Telecom Agency assumes the task of monitoring developments in the market with regards to the operational targets.

In Sweden municipalities play a crucial role in the operational implementation of network deployment by way of controlling access to municipal land and granting licenses to operators rolling out networks. Furthermore, it is also quite common for municipal city networks and housing companies to provide broadband services themselves (ranging from wholesale to consumer services). Many municipal city networks own and/or operate a fibre-based infrastructure. According to the Swedish Broadband Strategy, city networks owned around 25 – 30 % of the total fibre infrastructure in 2008.

Overall, Sweden is currently among the countries in the EU with a very advanced NGA coverage base-

**Main Challenges for NGA roll-out Sweden:**

- Avoidance of delays within funding programmes
- Possibly increase of funding for achieving full white spot elimination
- Identification of a take-up target to increase measurability of success
- Relatively low rate of cable subscriptions

line. By 2015, Sweden had a basic broadband coverage (> 2 Mbps) of 99 % and NGA availability (> 30 Mbps) of 76.4 %. Towards decreasing the remaining gap in coverage, the Swedish strategy views satellite as a viable option for remote areas. Mobile and wireless solutions are also expressly contemplated in the context of reaching out to areas lacking access or suffering from low capacities, if necessary by freeing additional frequencies on the spectrum.

Measures to reduce costs such as the laying empty ducts are also mentioned with the aim of minimising difficulties faced by operators when deploying networks. For instance, in its budget for 2012, the Swedish government allocated SEK 120 million for the laying of ducts for the period 2012 to 2014. A monitoring mechanism assesses progress in the development of access to broadband on a regular basis. In sum, Sweden opts for a collaborative market-driven network roll-out, expecting national authorities to provide a favourable environment for doing so.



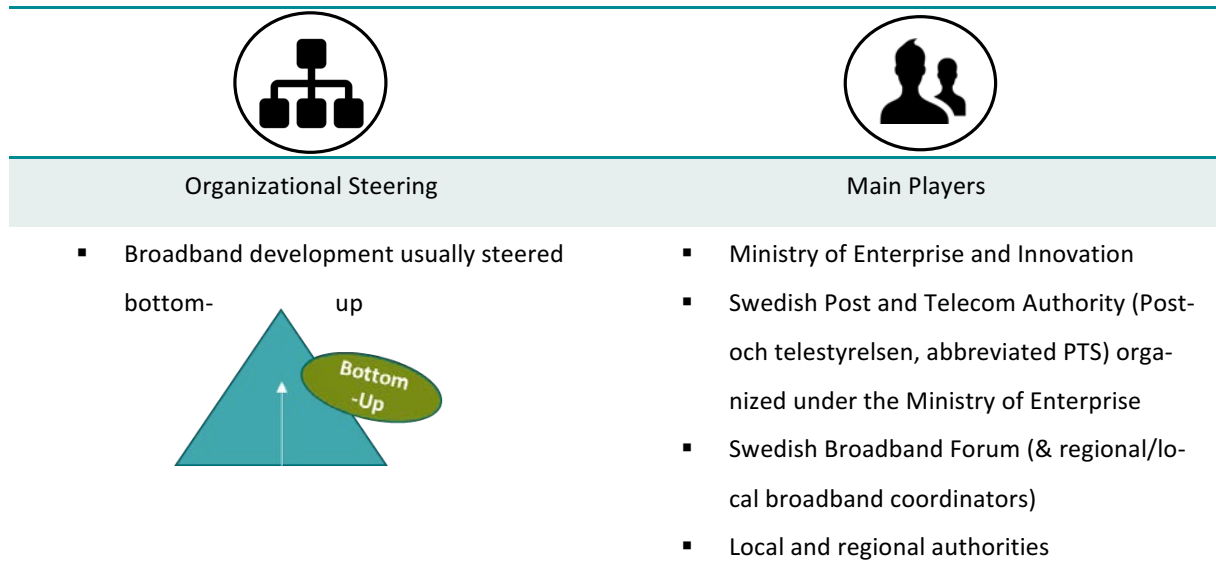


Figure 42 Organizational Steering & Main Players Sweden

#### 7.2.27.2 Feasibility Assessment

Concerning the achievement of the Swedish NBP targets, differing results are expected. There is a national coverage target (90 % coverage with 100 Mbps by 2020) which is well higher than the DAE coverage target (100 % coverage with 30 Mbps by 2020). Regarding the DAE target, we conclude that Sweden has a **low probability** to meet the target. Current NGA coverage is 76 % and there is a strong digital divide: only 13.9 % of the rural Swedish population is currently covered by NGA networks. Due to the vast size of Sweden and its low population density, this result is not surprising. However, regarding the national coverage target, we conclude that there is a **medium probability** of achievement. Sweden has one of Europe’s most advanced fibre infrastructure with high end access for the majority of its population. Within urban areas, FTTP is widely available. Furthermore, there are lots of regional initiatives to aggregate demand and deploy FTTP for previously underserved areas. We therefore expect that it will be possible to meet the national target despite the fact that still a substantial part of the rural population will not be able to subscribe to similar bandwidths.

Concerning the DAE take-up target (50 % of households subscribing to 100 Mbps or more by 2020), we calculated that currently 27.06 % of the Swedish population fulfil this criterion – one of the highest values across Europe. As there is still a strong growth for ultra-fast bandwidths (+14 %) and at least discernible progress on new fixed broadband connection (+0.8 %), we conclude that there is a **high probability** that Sweden will achieve the target.

FTTP is the most dominant technology for new connections and upgrades across Sweden. Cable networks (20 % fixed broadband market share) are stable but not expanding. There is a strong bottom-up

movement in Sweden with roughly 180 local operators deploying FTTP, partly supported by state aid. ICT services are well accepted in Sweden: rent mark ups for high-end inhouse wiring and FTTP connections are common and accepted, so are fees for initial connections. The overall perception is that there is a high willingness to pay, however, one has to realize that the costs for subscriptions are amongst the lowest in the EU (0.7 % of the median monthly income).

The Swedish NBP includes both strategic and operational aspects. Overall, within organizational, supply side, and demand side measures, the importance of local actors is being stressed and there is a clear division of tasks between national and local authorities. Monitoring procedures concerning the implementation of the NBP are described but sometimes lack concrete indicators. However, potential investors (municipal networks, utility providers) are addressed in detail. Regarding the demand side, there are general statements, outlining the importance of ICT services for Sweden's future.

Overall, Sweden is in a very decent position. FTTP is rapidly expanding, local authorities and utility providers are active in rural areas and deploy high-end infrastructures to close the digital divide. Furthermore, affordability is not an issue which leads to a situation where no market saturation (in the ultrafast segment) is foreseeable. Although the NBP does not provide for a lot of concrete measures, bottom up initiatives, private and public investment and high demand for ultrafast connectivity make sure that Sweden is well on track to achieve its targets.

## 7.2.28 United Kingdom

### United Kingdom facts & figures

Degree of self-governance:	Unitary state (Constitutional monarchy)
Population:	64,875,165 (12.74 % of EU) <sup>I</sup>
Population density:	266.4 per km <sup>2</sup> (EU average: 116.7 per km <sup>2</sup> ) <sup>II</sup>
Size:	248,528 km <sup>2</sup> (6.12 % of EU) <sup>III</sup>
Topography:	Mountain ranges in Scotland and Wales, rolling hills in Northern Ireland, lowlands in England, highlands north-west of the Tees-Exe line
Fixed BB incumbent market share:	BT (British Telecom): 32 % (EU average: 41 %)
NGA coverage:	91 % (EU average: 70.9 %) <sup>IV</sup>
Lowest price for NGA subscription:	26.47 EUR <sup>146</sup> (EU lowest price: 11.42 EUR; EU average: 26.12 EUR)

<sup>I</sup> 1 January 2015, Eurostat

<sup>II</sup> 2014, Eurostat

<sup>III</sup> Europa.eu

<sup>IV</sup> June 2015, DESI 2016

Table 63 United Kingdom facts & figures

<sup>146</sup> Please be aware of the dependency of NGA prices on national economic disparities, such as income per capita or GDP. As of this, the present numbers serve as a reference point rather than allowing absolute price comparisons.

7.2.28.1 *Key Features*

The UK has drafted a series of strategy and policy papers setting the framework for broadband infrastructure development. Furthermore, Scotland, Northern Ireland and Wales have developed their own plans, which generally complement but also go beyond the UK’s strategy, especially regarding broadband bandwidth and coverage targets.

UK’s initial Broadband Plan “Britain’s Superfast Broadband Future” was devised under the auspices of the Department for Business Innovation & Skills in December 2010.<sup>147</sup>

<b>National Broadband Plan of UK: key facts</b>	
Main strategic document(s):	UK Next Generation Network Infrastructure Deployment Plan (March 2015), digital communications infrastructure strategy
Targets:	<ul style="list-style-type: none"> <li>▪ At least 100 Mbps for nearly all UK premises (no date)</li> <li>▪ 95% coverage with 24 Mbps</li> </ul>
Identical to DAE-Targets:	No

Table 64 NBP UK key facts

The strategy paper is not too concrete on measurable broadband targets such as download-speed or coverage rate; it rather stresses a general commitment by the government to ensure “the rapid roll-out of superfast broadband across the country”.

In a successive guidance note by the government entitled “Broadband Delivery UK” first published in February 2013<sup>148</sup>, the country further substantiates its approach stating that its objectives are to provide access to basic broadband (2 Mbps) for all by December 2015 and to provide superfast broadband coverage (defined in UK as > 24Mbps) to 90 % of the UK by early 2016, 95 % by December 2017. With these targets, the UK would fall short of meeting the DAE objectives. The guidance-note also initiated a tool to encourage take-up of superfast broadband by SMEs and support growth called Broadband Connection Voucher Schemes. The voucher scheme ran from December 2013 until October 2015 with over 50,000 vouchers issued to SMEs and 37,000 vouchers issued since April 2015 across 50 UK cities.

Since the publication of the Digital Agenda Europe, UK’s government has consecutively contrived a number of partially non-binding guidelines related to in-house wiring<sup>149</sup>, micro trenching and street

<sup>147</sup> Available online (English version): [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4865](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4865)

<sup>148</sup> Available online (English version): <https://www.gov.uk/guidance/broadband-delivery-uk>

<sup>149</sup> Available online (English version): [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/78511/10-1339-pas-2016-next-generation-access-new-build-guide.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/78511/10-1339-pas-2016-next-generation-access-new-build-guide.pdf)

works<sup>150</sup> as well as a permit scheme concerning broadband related works in public spaces<sup>151</sup>. The in-house wiring note recommends fibre over copper, referring to the benefits and cost-efficiency of the former. The guidance-note on micro trenching and street works mostly revolves around cost-reduction measures. Altered permit schemes aim at a simplification of network-related works such as the installation of street cabinets.

In a recently published policy paper by the Department for Culture, Media & Sport entitled “UK Next Generation Network Infrastructure Deployment Plan<sup>152</sup>” (March 2015), the UK has updated its overall broadband speed and coverage targets, now aiming at providing “95 % coverage with 24 Mbps by 2017 and at least 100 Mbps to nearly all UK premises (no date).”<sup>153</sup> However, no time frame is given for the implementation of these ambitious targets. In the future as it has in the past, the UK government continues to perceive its role mainly as a facilitator of private investment in infrastructure, for instance by providing policy stability, and supporting the market. Importantly, in its new strategy, the government calls for “local leadership” via assisting and providing local information and expertise in the application and planning process of telecommunications companies and commits to implementing the EU’s Cost-Reduction Directive in order to lower the costs of deployment (e.g. by coordinating street works or duct access). The UK’s NBP discusses the possibility of overhead or aerial deployment of electronic communications cables as well, where the local community is in agreement, as a method which carries lower costs than buried network infrastructure. BDUK is responsible for providing support and guidance and providing tools such as central mapping databases. In terms of funding, the English government states an investment commitment over 530 million £ by 2014/2015, which is mostly reserved for underserved areas.

All in all, the UK government aims at achieving its goals via a diverse approach involving different fixed broadband technologies. “Freeing up further 4G spectrum, piloting superfast satellite connections and looking to increase the Universal Service Obligation (in discussion is a 5 Mbps threshold)” are further actions planned. In other words, the UK appears to put comparatively high significance on mobile and satellite technology in reaching its country-wide broadband targets.

---

<sup>150</sup> Available online (English version): [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4866](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4866)

<sup>151</sup> Available online (English version): [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4868](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4868)

<sup>152</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/418567/UK\\_Next\\_Generation\\_Network\\_Infrastructure\\_Deployment\\_Plan\\_March\\_15.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/418567/UK_Next_Generation_Network_Infrastructure_Deployment_Plan_March_15.pdf)

<sup>153</sup> Available online (English version): <https://www.gov.uk/government/publications/the-digital-communications-infrastructure-strategy/the-digital-communications-infrastructure-strategy>

While there are no regional broadband plans in the conventional sense, the “Nations of the UK”, namely the Scottish and Welsh governments, have made public additional broadband coverage objectives, priorities and action areas.

Scotland seeks in its national strategy entitled “Scotland's Digital Future: Infrastructure Action Plan” from January 2012 “to deliver world-class digital access to all of Scotland by 2020 with an interim milestone of delivering next generation broadband (40 – 80 Mbps) to 85 – 90 % of premises by 2015 and putting in place measures to ensure an uplift in service delivered to the remaining 15 %”<sup>154</sup>. While the precise meaning of “world-class” internet is not explicated in the respective strategy paper, elsewhere on the official homepage of the government the following definition is put forward: “There is no fixed definition of what world-class access will look like in the future. Today world-class would probably be speeds of between 100 Mbps and 1 Gbps. In 2020, this may differ.”<sup>155</sup> The broadband plan also envisions measures to increase take-up and usage. Overall, it can be said that the Scottish government, with its commitment to achieve country-wide download speeds higher than 100 Mbps by 2020, exceeds the DAE broadband targets.

The Welsh government’s pendant to a National Broadband Plan has been published in December 2010 under the title “Delivering a Digital Wales.”<sup>156</sup> Therein the government commits to providing next generation broadband to all businesses by mid-2016 and all households by 2020. NGA broadband is thereby defined in terms of a minimum of 30 Mbps download speed. Notably, the Broadband Plan stresses that infrastructure projects funded through

Main Challenges for NGA-rollout in the United Kingdom:

- Decrease of the digital divide needed
- Low LTE coverage in rural areas
- Lack of a centralized infrastructure mapping system
- xDSL technologies as the main source of connectivity
- Low market share for FTTP

public sources will ideally aim at “100 Mbps, to avoid the need for repeated investment at a later date”. Wales focuses on a mix of private investments and public interventions, the latter predominantly focusing on white spots. Importantly, “Superfast Cymru” is the Welsh government’s delivery body for its

---

<sup>154</sup> Available online (English version): <http://www.gov.scot/Resource/0038/00386525.pdf>

<sup>155</sup> Available online (English version): <http://www.gov.scot/Topics/Economy/digital/action>

<sup>156</sup> Available online (English version): <http://gov.wales/docs/det/publications/101208digitalwalesen.pdf>

superfast broadband programme and assumes an operational role in the network development process. The Superfast Cymru contract was signed with the dominant incumbent British Telecom (BT) in 2012 and supported by £ 205 million of public funding.<sup>157</sup>

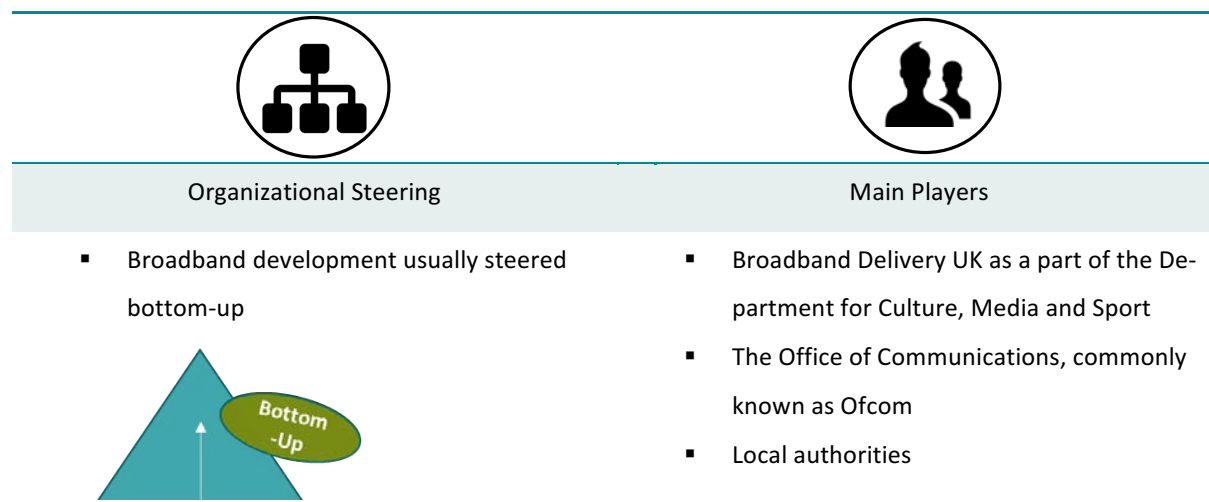


Figure 43 Organizational Steering & Main Players UK

#### 7.2.28.2 Feasibility Assessment

The feasibility assessment of the UK's NBP delivers mixed results. The UK has defined its own national Broadband target (100 % coverage with ultrafast broadband, currently defined as 24 Mbps by 2020). Both the national and the DAE coverage target (100 % coverage with 30 Mbps by 2020) have a **low-medium probability** to be met. Currently, NGA coverage in the UK is currently already very high at 90.5 %, although a digital divide is well discernible. Within rural areas, only 47.4 % are able to subscribe to an NGA connection. This digital divide is the reason why there is still doubt if the coverage targets can be met entirely. Especially considering the low fixed broadband penetration growth rate of 0.4 % it is doubtful if the digital divide can be bridged. This problem is enhanced by the fact that LTE is not a viable substitute in rural areas (only 10 % coverage in rural UK). The announced plans of the incumbent to begin deployment of FTTP+G.fast in 2017 could be remedy for rural coverage, but it is yet unclear whether this investment will reach lowly populated areas. As a positive aspect, cable networks are currently covering 45 % and are still expanding. There are substantial state aid funds available and a discussion concerning 10 Mbps USO is prevalent, which could further provoke a faster increase of connectivity.

<sup>157</sup> Cf. Hirst, David (2016): Fixed Broadband: Policy and Speeds. Briefing Paper, Number CBP06643, House of Commons Library. Available online: <http://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN06643#fullreport>

Concerning the take-up target (50 % of households subscribing to 100 Mbps or more by 2020), there is a **low-medium probability** that the target can actually be met. We calculated that currently 6.15 % of households subscribe to such ultrafast bandwidths. Given the relatively high general fixed broadband penetration rate of 37.2 % (as of pop.) and the low growth of new broadband subscriptions (+0.4 %), it is unlikely that the targeted penetration rate could be a result of new connections. However, upgrading of existing connections is a viable option. Last year, there was a growth rate of roughly 152 % concerning the market share of ultrafast connections. If that trend continues, the targeted penetration rate could be achieved. However, it will be decisive for the supply to keep up with the demand. An increased deployment of FTTP will be necessary if shortages are to be avoided. Thus the main issue within the UK will be to increase the coverage in urban and rural areas with high-end infrastructures capable of reliably delivering 100 Mbps by 2020.

The UK's NBP is accompanied by regional broadband strategies (e.g. Digital Scotland with differing targets, in this case to close the digital divide and develop a "*world-class*" digital infrastructure). Moreover, it should be noted that also various small scale local broadband projects driven by municipalities exist, constituting a valuable contribution to reaching the NBP target. Overall, the NBP is a strategic document with several operational elements. Not all measures within the NBP also define concrete deadlines or responsibilities. This at least is true for the measures aside the sections about state aid. The UK has defined substantial state aid programmes (combined worth 1.7 billion pound, e.g. a satellite voucher scheme for SMEs) and possible business models to bridge its digital divide. Concerning transparency measures to bring down the costs of deployment, the UK's NBP could be more concrete. The cost reduction directive has not been transposed yet and the recent BREXIT decision might negatively affect its further transposition to national law. Concerning the demand side, the UK's NBP defines as a measure a marketing campaign aiming at the promotion of digital services for citizens and business alike.

Generally, the UK is in a solid position, but establishing supply side measures to support the exchange of xDSL technologies with FTTP and cable and to bridge the digital divide will continue to be a challenge. These two issues are the striking hurdles the UK has to overcome. However, there are several interesting aspects which might give the UK the momentum needed for tackling these issues: 1. There are currently discussions regarding a 10 Mbps USO, which will, if approved, be an important factor for rural connectivity as (fixed) technologies to be deployed there will usually be able to provide more than 10 Mbps anyway. 2. The incumbent BT established a wholesale provider, further investing in middle-mile networks. 3. The incumbent announced to begin with large scale FTTP+G.fast deployment by 2017 (see above), and thus increasing the available supply significantly.



Overall, there are several tendencies that will further increase the UK's connectivity, leading to a generally positive outlook for the country's broadband development, even though the targets might not be achieved by 2020.

## 8 Main Trends

Within the analysis of the NBPs on European and on National Level, we found that there are several defining conditions that are in favourable for NGA roll-out in each given country. Generally speaking, we found conditions that helped countries to achieve higher degrees of connectivity. However, one has to bear in mind that not all of these factors can be influenced by governmental strategies. Existing infrastructures, population density, degree of urbanization and several other aspects are difficult to change and often not within the sphere of influence of democratic governments. The conditions described within this section are therefore a mixture of influenceable and non-influenceable conditions that affect the current situation in the respective Member States. Often governments try within their NBPs to react to these conditions and define appropriate measures (e.g. low population density can be addressed by supply side intervention, such as funding schemes). This section shall thus describe these factors and possible measures that Member States could adopt. In doing so, we will again rely on official data (DESI/EDPR and other sources).

### 8.1 Favourable conditions for NGA roll-out

#### 8.1.1 Market pressure on the incumbent

It is evident that competition helps to initiate the NGA-market. However, the technologies used seem to be rather irrelevant. In some cases, cable based operators pressure the incumbent to deploy FTTP, in other cases its WLAN technologies that challenge xDSL technologies and in even other cases there are FTTP providers competing with the VDSL Vectoring networks of the incumbent. In any case, alternative operators stimulate a general improvement of networks across Europe, triggering vast investments by incumbents that try to defend their market shares.

Market pressure especially occurs in countries with substantial cable network (shown in Figure 44). These countries are usually better concerning their overall NGA-coverage (correlation coefficient: 0.54). This result is of course not very surprising, as cable networks are often the primary source of NGA coverage. However, we see that even in cases with the highest cable NGA market share (MT with 51 % of all NGA subscriptions and a cable coverage close to 100 %), there is still a roughly 50 % non-cable NGA market share. This, in conclusion lets us assume that other operators invest in their own infrastructure to compete with the cable networks. Therefore, it is very likely that the existence of cable networks fosters overall infrastructure based competition.

## NGA Coverage and NGA-market share of cable subscriptions

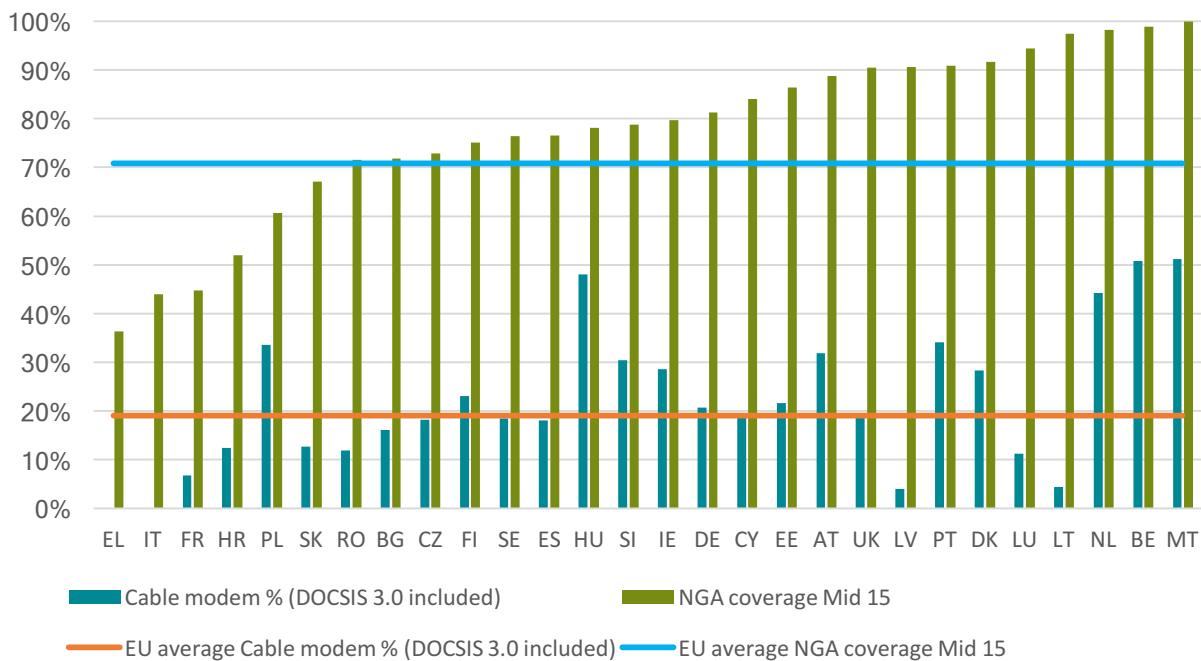


Figure 44 NGA coverage and market share of cable subscriptions 2015 (own illustration based on DESI 2016)

However, we found that the actual organizational structure of a competitor does not matter for determining its effect on the incumbent. The sole existence of a competitor that can offer a comparable or better quality of service at comparable prices forces the incumbent to upgrade its networks in order to compete with these new entrants.

By now, there are several organizational models for Infrastructure Investors across Europe (Table 65). The different models serve the different layers of the digital infrastructure value chain respectively (passive infrastructure, active infrastructure, services). Although vertically integrated corporations are still the major sources of connections and investments alike, there are also several other types emerging. For instance, Germany and Austria see several Public Special Purpose Associations which deploy passive infrastructure, while private companies operate active components and offer services (Model 3). Especially in Eastern European countries (e. g. Czech Republic), we see Public Private Partnerships (Model 4), while in England and Ireland vertically integrated private companies prevail (Model 6). An interesting aspect concerning these models is a rising number of cross-sector cooperations. In Sweden, Denmark and several other countries we see an increased activity of utility providers that invest into all layers of the value chain.

Stages of the Value Chain		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Stage 1</b>	<b>Infrastructure-/ Network roll-out</b>						
	roll-out and rent of Dark Fibre						
<b>Stage 2</b>	<b>Network Operation</b>						
	roll-out and operation of active network						
<b>Stage 3</b>	<b>Services</b>						
	offering services						

Table 65 Organizational models for Infrastructure Investors across Europe

If we have a look at the correlation of incumbent market shares (fixed broadband) and the median fixed broadband prices for end-customers (Figure 45), we can observe another positive aspect of competition: a correlation coefficient of .38 indicates that there is a link between the position of the incumbent and the end customer prices. Generally speaking, the less dominant the incumbent, the lower the median end customer prices. This correlation in turn increases the probability of higher take-up rates. Therefore, we can conclude that increased competition positively affects coverage and take-up alike.

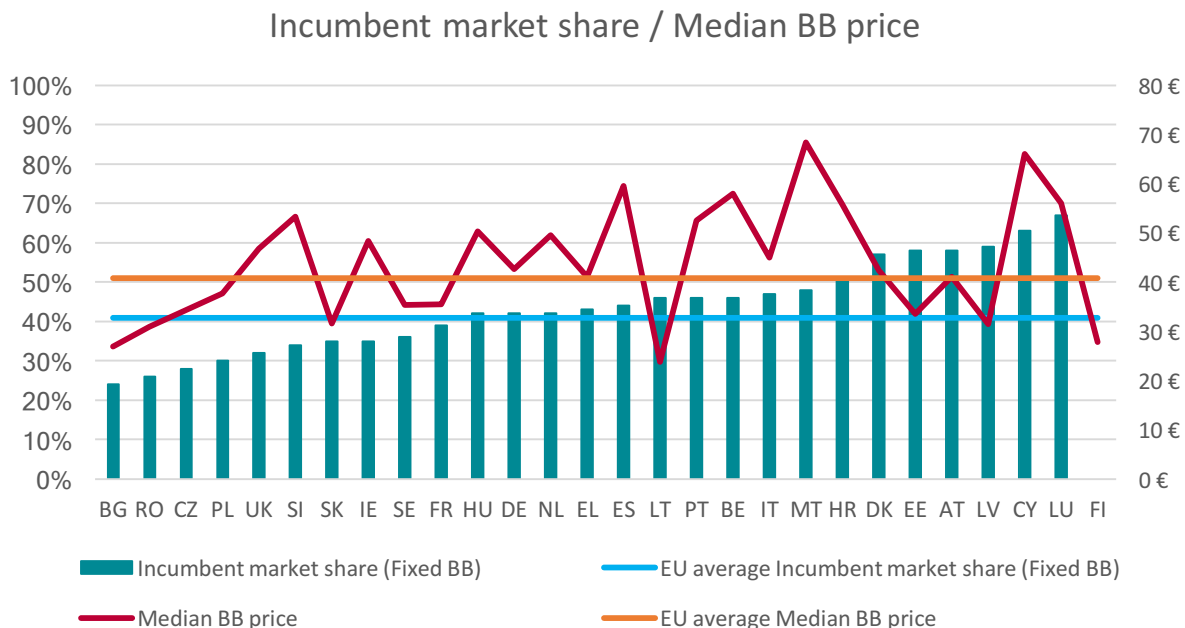


Figure 45 Correlation Incumbent market share / Median BB price (own calculation & illustration based on DESI 2016)

- ➔ Possible NBP measures: infrastructure mapping tools, open access to state owned infrastructures, financial incentives for operators to enter the market, public investments (e.g. wholesale providers)

### 8.1.2 Demand side activities and digitization of society as a whole

The acceptance of ICT-services within a given country is usually directly linked to take-up and therefore indirectly also linked to coverage. There are several indicators for the digitization of a country (e.g. digital skills of the population, availability and usage of eGovernment, usage of ICT technology in business, education, health care and other areas). However, they are often difficult to quantify. A very simple, yet meaningful indicator is the number of “non-liners”, meaning the amount of persons that have never used the internet in their life. This is an interesting figure to evaluate since a low share of non-liners indicates that a country has become truly “digitized”, with digitization covering society as a whole, notwithstanding other socio-economic factors such as age, income, education or health. By contrast, a high number of non-liners means that a significant percentage of a country’s population is completely excluded from digital life, not even being able to enjoy the most basic benefits of the digital world, which clearly indicates that a profound digitization of society has not taken place.

The number of “non-liners” is obviously also linked to the quality of broadband infrastructure. The better the infrastructure and thus the better, faster and simpler the access to digital applications and services, the easier it is to illustrate the vast benefits of the digital world to non-liners and thereby turn them into “digital citizens”. This relation is illustrated by Figure 46. As we can see, the percentage of non-liners correlates negatively with NGA coverage (correlation coefficient of -0,37), meaning the better the infrastructure, the lower the number of non-liners. Nevertheless, we can also observe that there are many countries which have a decent NGA coverage, but still a relatively high share of non-liners. The reasons for such a development are usually to be found in a lack of digital awareness and digital skills, but to some extent also in affordability. This underlines the importance of demand side activities, which are a powerful tool that is often neglected by the National Broadband Plans.

## NGA Coverage vs. Percentage of "non-liners" (2015)

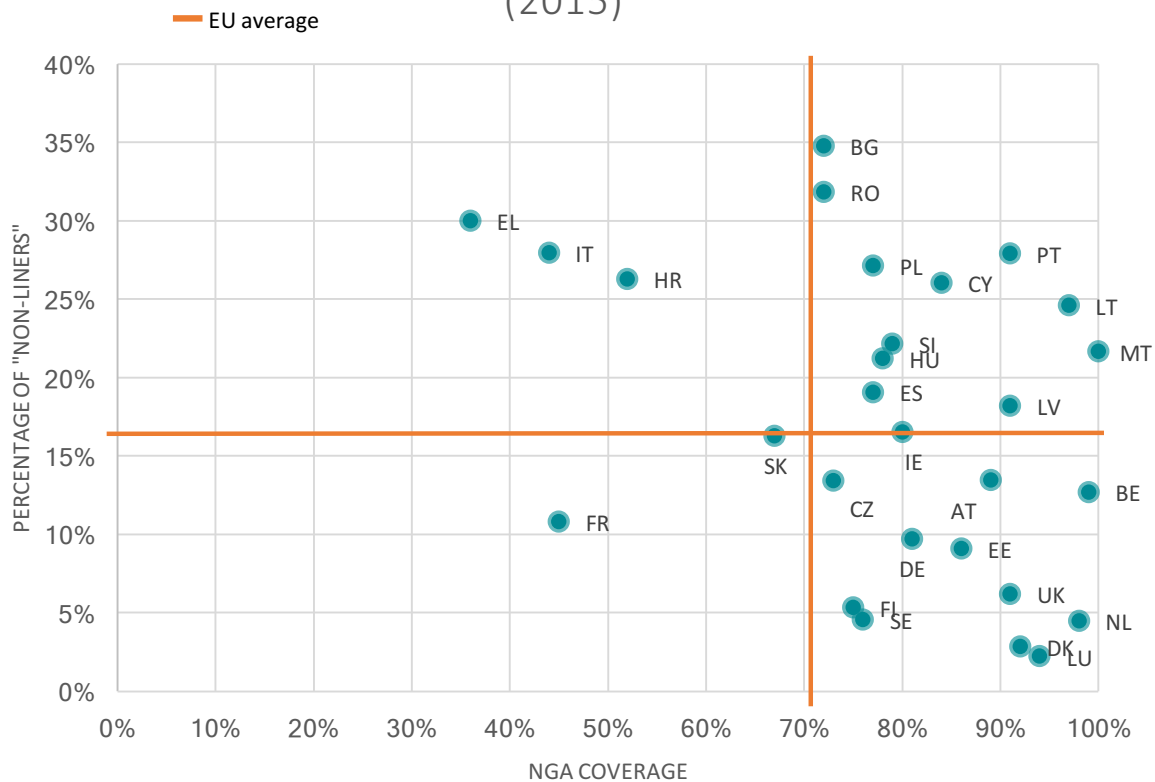


Figure 46 NGA coverage vs. "non-liners" (own calculation & illustration based on DESI)

- ➔ Possible NBP measures: awareness raising campaigns, public WLAN, use of digital media in education, tax deductions for end customers, vouchers, capacity building

### 8.1.3 State aid and financial instruments

Although there is still significant private investment across Europe and the number of white spots decreases on a daily basis, some areas will never be commercially viable. Public intervention is therefore sometimes inevitable to close the digital divide. To tackle this, in a number of cases Member States have decided to extensively use European Investment and Structural Funds (ESIF) – notably ERDF and EAFRD – for the extension of broadband networks, amounting to a total of over € 6 Billion by 2020.

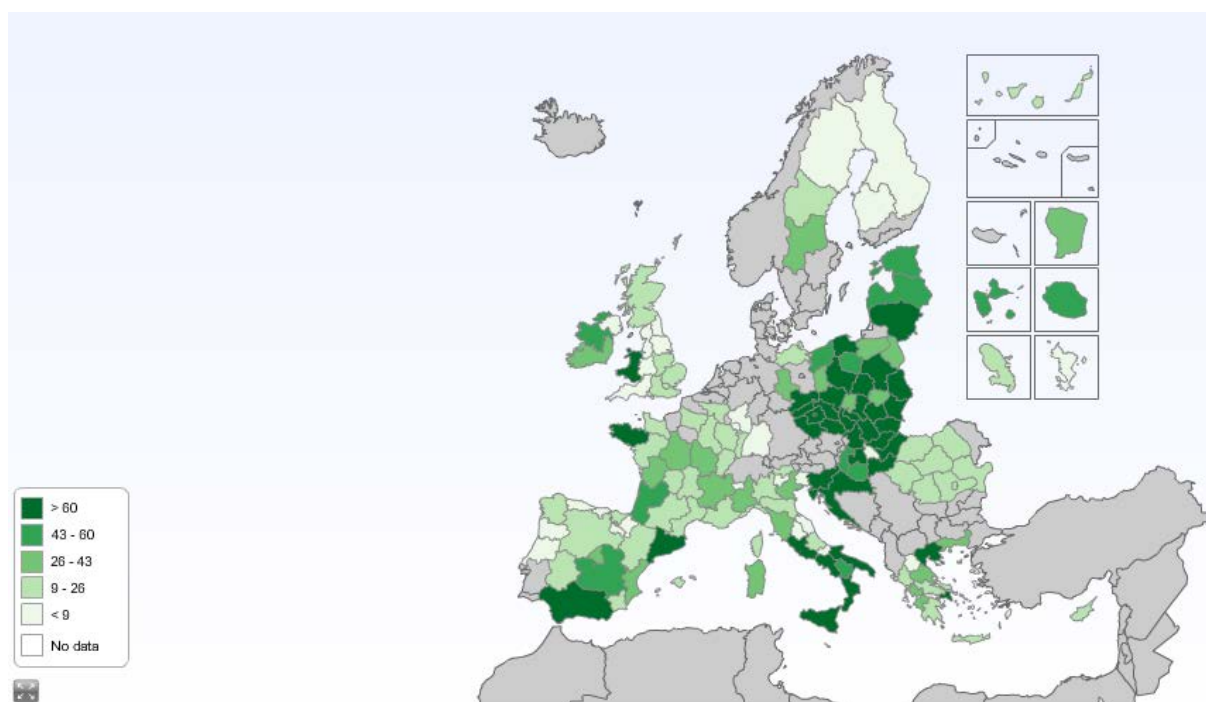


Figure 47 Planned ICT Investments - European Regions (category of intervention 045, 046, 047 048) under ESIF (million €)  
 Source: European Commission, ICT monitoring Tool (<http://s3platform.jrc.ec.europa.eu/ict-monitoring>).

Individual countries like Poland and Italy plan to invest more than a € 1 Billion of ERDF each; France, the Czech Republic, Spain and Hungary are in a range of € 400 million to € 700 million of ERDF each; Croatia, Greece and Slovakia between € 200 million and € 400 million of ERDF each. The administrative capacity to maximise the leverage on public (national or regional) and private co-funding (notably through the use of financial instruments) will be crucial to support projects rolling out the next-generation of broadband networks. These European funds are an important cornerstone of many National Broadband Plans and help to develop ICT-infrastructures, especially within rural areas with low commercial interest.

Member State	ESIF Funds	Member State	ESIF Funds	Member State	ESIF Funds	Member State	ESIF Funds
<b>Italy</b>	1,165 M	<b>Croatia</b>	335 M	<b>Ireland</b>	75 M	<b>Belgium</b>	21 M
<b>Poland</b>	1,025 M	<b>Greece</b>	323 M	<b>Sweden</b>	71 M	<b>Cyprus</b>	19 M
<b>France</b>	628 M	<b>Slovakia</b>	278 M	<b>Slovenia</b>	68 M	<b>Malta</b>	18 M
<b>Czech Republic</b>	563 M	<b>United Kingdom</b>	164 M	<b>Lithuania</b>	64 M	<b>Portugal</b>	8 M
<b>Spain</b>	449 M	<b>Germany</b>	139 M	<b>Latvia</b>	51 M	<b>Finland</b>	0.5 M

<b>Hungary</b>	400 M	<b>Romania</b>	100 M	<b>Estonia</b>	43 M	
----------------	-------	----------------	-------	----------------	------	--

Table 66 Current planned broadband and digital networks investments under ESIF

Source: European Commission, ICT monitoring Tool (<http://s3platform.jrc.ec.europa.eu/ict-monitoring>)

- ➔ Possible NBP measures: national funds and ESIF funds, dedicated financial instruments (e.g. loans), guarantees, PPP models

#### 8.1.4 Regulation (AOs to access different infrastructures)

Regulation plays a major role in facilitating NGA roll-out. Most National Broadband Plans leave this topic to the mostly independent National Regulatory Authorities. However, although there are no measures described how the regulatory authorities should support NGA roll-out, they usually describe the ideal situation of a “level playing field”. It is evident that national regulatory authorities can play a vital role in increasing competition. A recent draft of an upcoming BEREC study stresses the importance of network related factors such as “availability of high quality ducts in access networks”. However, these capacities are only available in a small number of countries. Therefore, several other regulatory measures concerning access can increase NGA roll out, depending on the situation in each country (e. g. via LLU, SLU, VULA, duct access, access to civil works, fiber unbundling). The study concludes that infrastructure based competition is a main driver of NGA roll-out. Regulatory authorities can therefore play a vital role if they succeed in decreasing costs for late entrants that can subsequently put pressure on the incumbent and roll out their own NGA networks. Furthermore, access regulations can avoid duplication of infrastructure and from a macro-economic perspective, avoid a waste of resources as capacity utilization increases. However, a regulatory approach that is too strict may backfire and discourage investments.

- ➔ Possible NBP measures: asymmetric and symmetric access regulation (to civil works, ducts), possibly also dark fiber, LLU and VULA

#### 8.1.5 Population density and urbanization rate

One of the most defining characteristics for NGA roll out is the population density and urbanization rate. As shown on Figure 48, there is a correlation (correlation coefficient .35) between population density and NGA coverage. The explanation is simple: the more people are concentrated in one area, the cheaper the costs per connection. Malta is an outlier as it is extremely small with a comparably



high population density. The cases of Greece, France and Italy are particularly interesting. All of these countries show a comparably low NGA coverage, despite clear differences concerning population density. We hereby conclude that population density is not the single defining aspect, but other conditions inhibiting higher NGA coverage as well. In these cases, we assume that factors such as topography, macro- und microeconomic hardships as well as few investments in network expansion and upgrades are leading to distorted results.

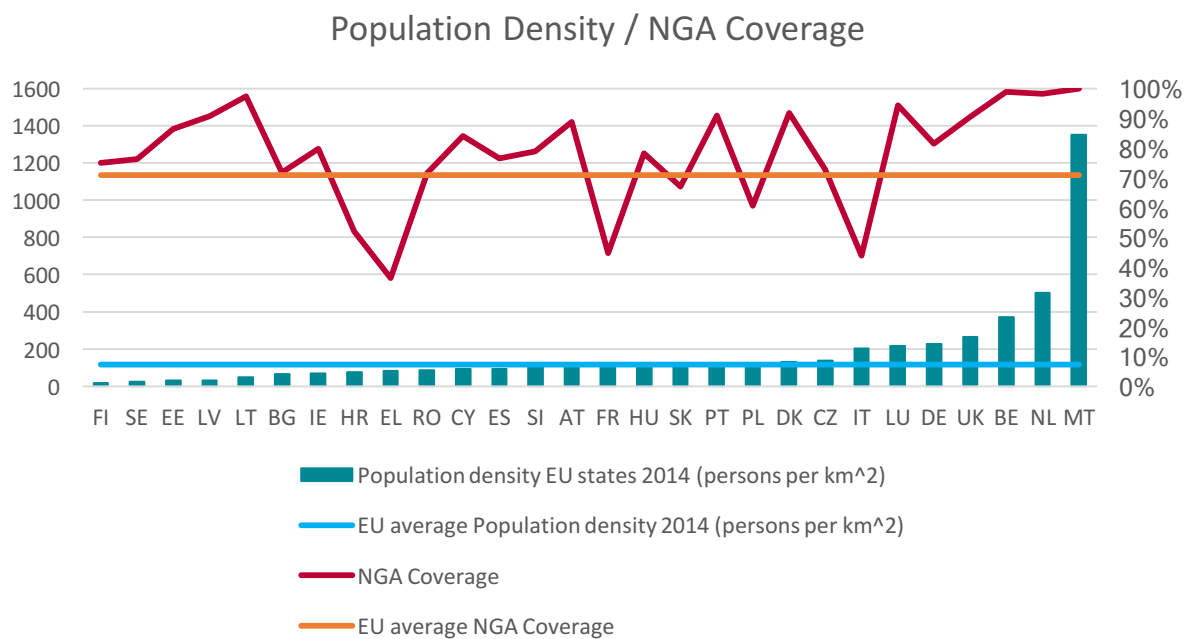


Figure 48 Population density / NGA coverage (own calculation & illustration based on EUROSTAT and DESI 2016)

Another important aspect besides the population density is the urbanization rate. Both a high degree of urbanization and a dense population indicate a potential business case that is in favour of private investments. Large urban areas are therefore an asset that supports swift NGA roll-out. The correlation between urbanization rate and NGA coverage (Figure 49) is similar to population density and NGA coverage (correlation coefficient .33).

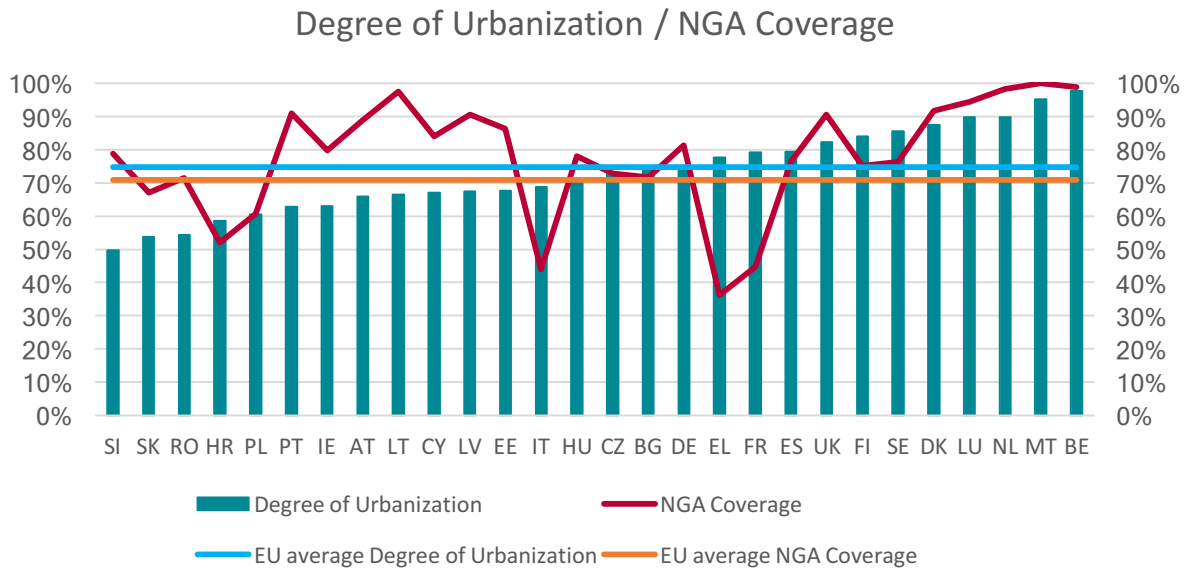


Figure 49 Urbanization / NGA coverage (own calculation & illustration based on World Bank Data and DESI 2016)

Both population density and urbanization rate cannot be solved by a National Broadband Plan, therefore these two indicators are framework indicators that clearly foster NGA deployment. National governments could in cases where low urbanization rate and low population density are given consider either the use of public funds, increased use of alternative methods of deployment (e.g. micro- and minitrenching, aerial deployment etc.), aggregated demand via special purpose associations or financial incentives such as vouchers or tax deductions. There are a variety of instruments that might be used if national governments want to mitigate the negative impact of these conditions.

- ➔ Possible NBP measures: bottom-up approaches for demand aggregation, changes regarding USO, public investments, alternative methods of deployment

### 8.1.6 Availability of ducts and upgradable networks

While available ducts in access networks can increase the speed of NGA roll-out, the inexistence of such ducts slows down the deployment of NGA networks significantly. Directly buried cables are especially problematic as they cannot easily be upgraded or exchanged as the main cost driver – civil works - will apply for any party, either owner of these cables or alternative operators wishing to serve the same areas. Although the influence of national governments and their respective National Broadband Plans on construction methods is limited, there are several examples where implementation processes solved these issues. For example, some countries use construction standards as a prerequisite for the receivers of funds (e.g. DE). In several countries there are also working groups for standardization, often led by the responsible ministry, a broadband competence centre or national regulators. Via these

standardization approaches, the national governments can at least incentivize the use of common standards that provide for future-proof constructions.

- ➔ Possible NBP measures: development of construction standards, permit granting procedures can be altered to only allow for future proof methods of deployment

### 8.1.7 Willingness to pay and affordability

A very important aspect regarding take-up of broadband services is affordability and the willingness to pay respectively. This aspect is often an outcome of the economic situation (defined through e.g. rates of unemployment, median income, purchasing power)

When we analysed the situation in each Member State, we realized that the NGA retail prices (lowest offer) vary enormously. The absolute costs of an NGA subscription vary from 11,42 € in Lithuania to 69,37 € in Cyprus (Figure 50).

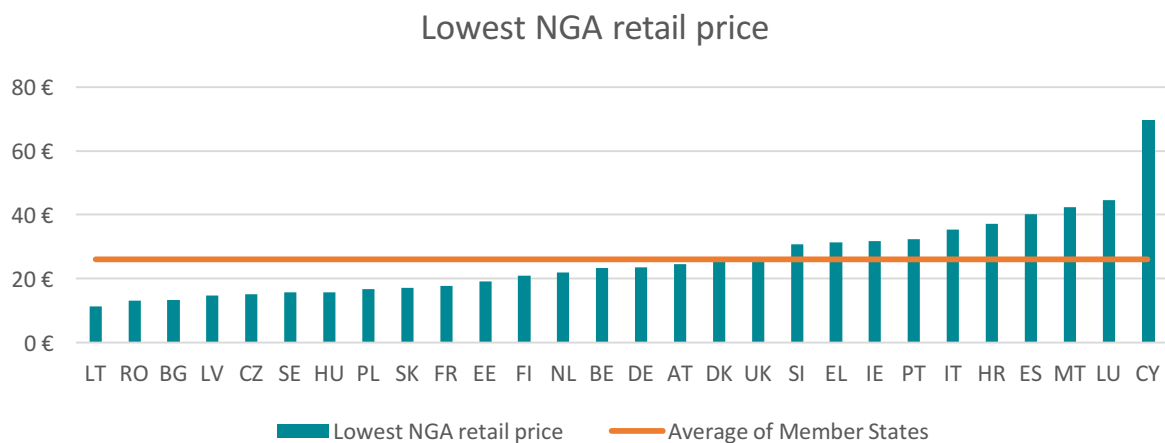


Figure 50 Currently lowest NGA retail price in MS (own illustration based on DESI 2016)

However, as described above, the absolute numbers cannot be compared as they do not reflect certain other aspects. For gaining more meaningful results, we put the Median monthly income of each Member State into relation to the lowest offer for an NGA subscription.

This relation changes the picture substantially (Figure 51).

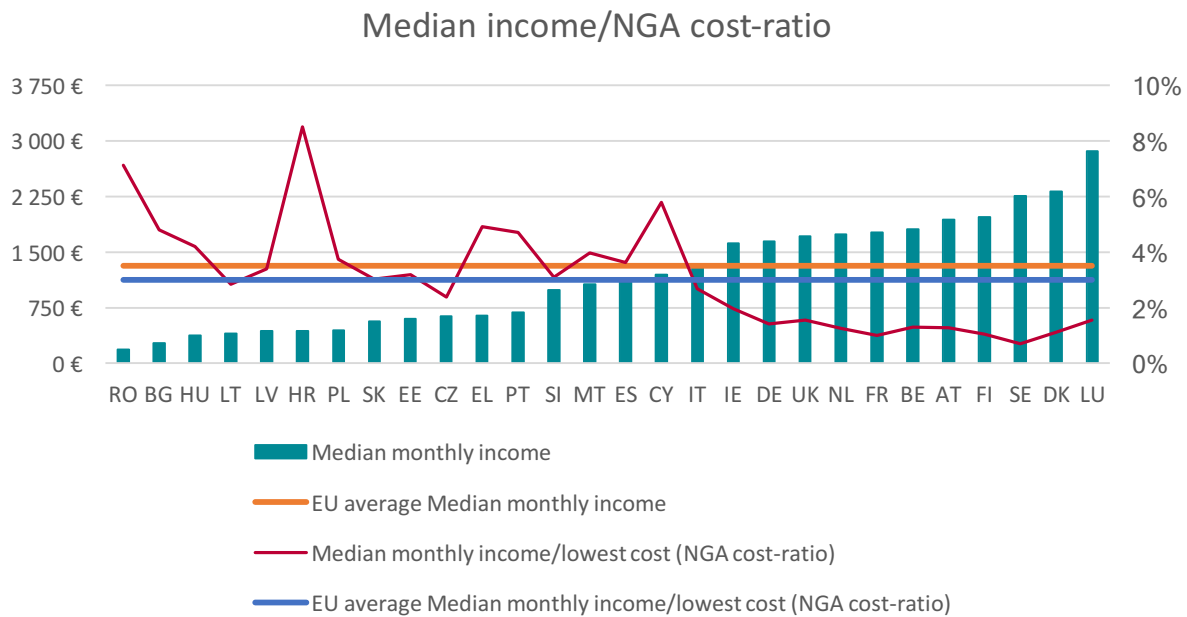


Figure 51 Correlation median income / NGA cost-ratio (own calculation & illustration based on EUROSTAT and DESI 2016)

By this comparison, we see some interesting developments. While the EU average median monthly income is 1314.58 €, the average lowest NGA offer is 26.12 € and the average ratio between median income and NGA subscription is roughly 3 %. Romanians pay an astonishing 7 % of the median monthly income on an NGA subscription, being the second highest value in the EU with only Croatians paying more while the Swedish population pays less than 1 %. This means that willingness to pay is an enormous asset. Sweden is often called as one of the countries with the highest willingness to pay, but in reality the subscription prices are low in comparison to the median income. However, it is still true that in Sweden initial costs for getting connected or even rent mark-ups are well accepted, which in turn is again a true indicator that the Swedish population is willing to pay for high quality of services. In any case, lower prices incentivize take-up. However, a fierce price driven competition can slow down investments as return on investment takes place in longer periods of time.

- ➔ Possible NBP measures: tax deductions, free public WLAN, free internet access within centers of education (e.g. universities, libraries, schools)

## 9 Good Practices for defining NBP measures

The national governments of the EU-28 define different measures within their National Broadband Plans to stimulate NGA coverage and take-up in their respective countries. Overall, we defined four spheres of influence an NBP could have, namely Demand side measures, Supply side measures, Regulatory and Organizational measures as well as Transparency measures. Although one could argue that all of them could be subsumed under supply side and demand side, a more detailed analysis seems to be more appropriate. Demand and Supply are both enormous factors for NGA roll-out, however, transparency measures recently gained momentum. They are the striking feature of the cost reduction directive and often cover demand side (service mapping) and supply side (infrastructure mapping) alike. Regulatory and organizational measures are also in the middle of demand and supply as they often set the framework how supply and demand can interact. All measures described within the NBPs can be categorized within these four spheres of influence.

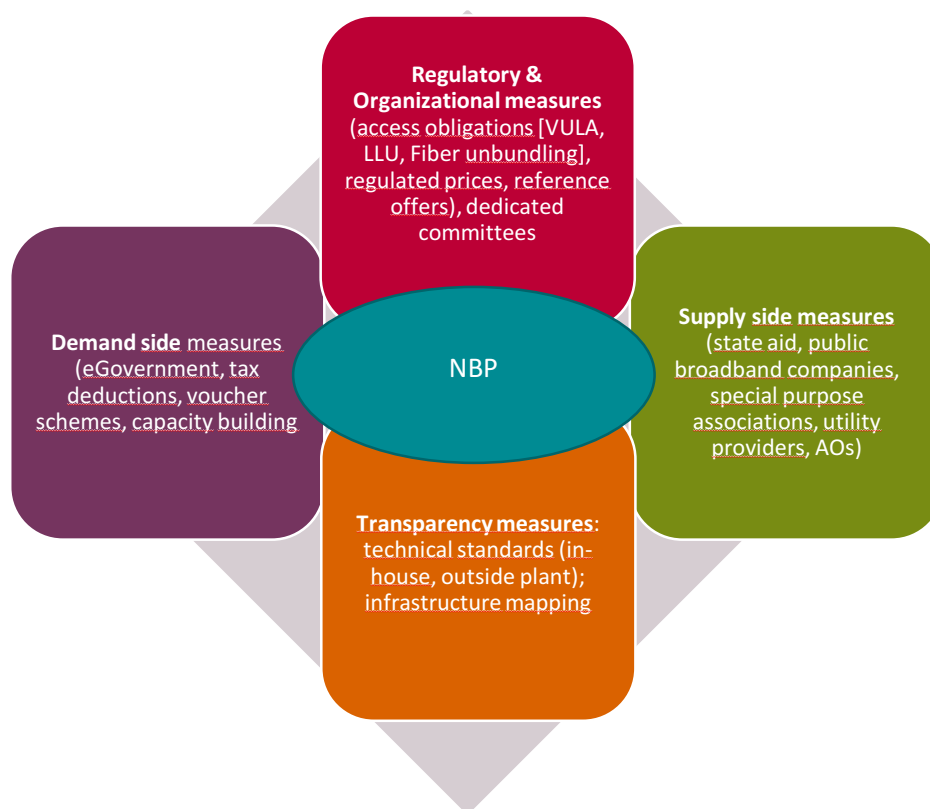


Figure 52 Spheres of influence of NBPs

As shown before, each NBP is especially detailed in one of these aspects. Table 67 shows this focus. Nonetheless, a clear distinction is often not possible as a strong focus on regulations (e.g. access obligations) are often accompanied by strong transparency measures.

Demand Side Focus	Supply Side Focus
HR, DK, EE, FI, HU, NL, SE	AT, FR, DE, IE, LT, RO, SK, UK
Regulatory, organizational Focus	Transparency Focus
CY, CZ, IT, LV, MT, PT, SI, ES	BE, BG, EL, LU, PL

Table 67 Focus of NBPs

The following map illustrates these different foci of the National Broadband Plans across Europe.

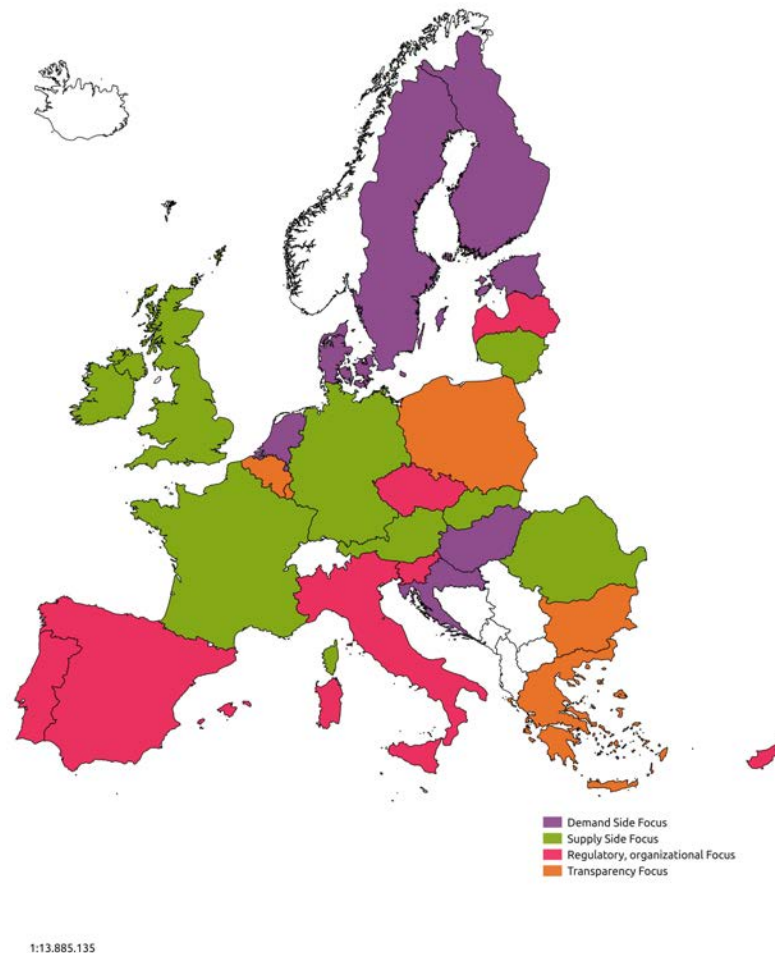


Figure 53 Focus of NBPs

As we can see, the NBPs are relatively even distributed towards each of the four spheres. Within the following section we will present one striking example of successful implementation of a measure related to one of each sphere.

### 9.1 Example I: Demand Side measure – Broadband Delivery UK’s voucher scheme

As a part of the British funding scheme Broadband Delivery UK, the British Government introduced a voucher system which ran from December 2013 until October 2015.

The voucher scheme was designed to stimulate demand by SMEs regarding broadband connections. The voucher covered the initial costs of connection (connection fees, end user's equipment), with a £100 minimum and a £3,000 maximum, not covering VAT. SMEs taking advantage of the voucher were obliged to subscribe to at least 20 Mbps with a possible upgrade to 30 Mbps. SMEs were only eligible, if they at least doubled their current business grade connection. The voucher could be used for dedicated lines or point-to-point microwave links.

The whole scheme was supported by dozens of cities that provided lists of registered suppliers. Furthermore, it was accompanied by extensive public relation measures, e.g. production of videos raising awareness concerning the competitive advantage that can be gained by connecting businesses to broadband networks. Additionally, a dedicated website providing general broadband knowledge and guidelines for SMEs and suppliers alike was set up. The voucher scheme was very successful: hundreds of registered suppliers won contracts to connect more than 55,000 British SMEs. The voucher system thus enabled these SMEs to invest in their digital capabilities and hereby work as multipliers concerning the need for digital infrastructures.

## 9.2 Example II: Supply Side measure – National Funding Program Germany

The NBP of Germany defined the national broadband targets as 100 % coverage with 50 Mbps downstream by 2018. However, it became obvious that private investments alone would not be sufficient to cover the extended rural areas within Germany in time. Therefore, the national government notified a funding scheme in 2015. It is one of the many national funding schemes to be found throughout the European Union, but differs in several aspects. First, currently it is worth roughly EUR 3.4 billion, making it one of the largest funding programs in Europe (being in one league with the French and the British programs). Municipalities and associations of municipalities are the beneficiaries of the funds. Two models can be financed: the gap funding model which applies when a municipality decides to tender the provision of broadband services as well as the operator model where municipalities deploy their own passive networks and tender the active operations.

In each call, a scoring model evaluates the most promising projects. The scoring model values those areas without commercial interest (defined by e.g. low population density, high costs per connection). The connection of business parks (with 1 Gbps symmetrical bandwidths) and institutional consumers are other aspects that increase the chances of a positive decision regarding the application. Currently



it is estimated, that the funding program will be responsible for the connection of several million German households with bandwidths of 50 Mbps or more. The funding program will hereby be an important factor to close the digital divide in Germany.

### 9.3 Example III: Regulatory, Organizational measure – Symmetric regulation

There are several countries across Europe whose regulatory approach differs from the traditional asymmetric regulatory approach (AOs to demand access to SMP operator's infrastructure). Countries such as France, Spain, Portugal and Lithuania stress the importance of regulations within their national strategies and acted accordingly by introducing different kinds of symmetric regulation (where all operators can demand access to passive civil infrastructures). In some parts, this access is expanded to ducts. Furthermore, in France there is also a symmetric in-house wiring access obligation in place. All of these countries have in common that symmetric regulation increased the overall availability of high-end infrastructures significantly. Despite initial fears that investments may stop, these approaches led to different kinds of cooperation between the operators. Often, operators now engage in joint construction and co-investment schemes to develop their networks to their mutual benefit. In Portugal, FTTP providers even entered commercial agreements that went beyond the actual access obligation and now grant each other open access to their fiber infrastructure. Symmetric regulation increases the utilization of network capacity and hereby reduces the risk of duplication of infrastructures. From a macro-economic perspective, this approach is most efficient for a country's welfare.

### 9.4 Example IV: Transparency measure – Polish NBP

Few NBPs are as detailed concerning transparency measures as the Polish NBP. While several NBPs describe the importance of access to existing infrastructures and different tools to achieve it, the Polish NBP is rather detailed. It describes the establishment of a service mapping and infrastructure mapping tool (by now in existence) that goes beyond other tools as it is already capable of visualizing infrastructures, services, demand and investments. Future improvements will primarily increase the available layers and give more detailed information. The establishment of this tool was announced within the NBP and underpinned by an implementation plan with schedules and responsibilities. Furthermore, the Polish NBP also includes several measures related to cost reduction. For example, it included a memorandum of understanding concerning the deployment of passive infrastructures between local and national authorities as well as telecommunication operators to increase joint construction and

sharing of infrastructures. Furthermore, Poland developed guidelines concerning permit granting procedures, minimizing the time needed until a permit can be issued. Additionally, a code for in-house wiring has been established. Within all of these areas, Poland has described clear measures and plans for implementation. Through this measures, Poland is already well advanced concerning the transposition of the cost reduction directive and has supported its recent stride towards better NGA connectivity.

## 10 Conclusion and Outlook (revised EU targets)

This study was designed to give an overview on the National Broadband Plans of the European Union. To achieve this endeavour, we have first analysed the state of connectivity on European and on National Level. We have seen that the achievement of the DAE targets (full NGA coverage and 50 % household penetration by 2020) is questionable on a European level, mainly due to a strong digital divide that is discernible throughout Europe. We then proceeded to analyse the National Broadband Plans and their respective national targets individually. We have seen that most countries will struggle to meet the European and their own targets respectively. However, we have identified several positive aspects that might positively change our assessment in the future: especially the strong demand for ultrafast bandwidths is a positive sign that can increase coverage and take-up alike. Furthermore, we have seen that in many countries there are strong efforts to incentivize and initialize NGA markets in rural areas. This is partly achieved through state aid, but sometimes also through cross-sector cooperation and demand aggregation.

We have seen that the involvement of local actors is gaining more and more importance with respect to deploying digital infrastructures in areas deemed economically not interesting for operators. These local actors act as catalysts, aggregate demand and build capacities whenever needed. Broadband competence centers already play a vital role within these activities. The recently established BCOs might possibly further support these local activities.

Another important aspect of the evaluation of the NBPs was the transposition of the cost reduction directive. Although few countries have already transposed the directive, some are very advanced and had some provisions of the directive already incorporated within their national legal framework, partly even before the directive was issued. However, we have seen that access to infrastructures is often limited by the lack of infrastructure mappings or cadastres.

After the country sections, we have shown some general trends that we have discovered during the study and illustrated the general possibilities countries have to influence them. Finally, we have shown how the measures included in the NBPs can be categorized and have shown some positive examples of the practical implementation.

During the final phase of this study, the EU announced the revision of the objectives announced in the DAE. The upcoming objectives include the following

- All main socio-economic drivers, such as schools, universities, research centres, transport hubs, all providers of public services such as hospitals and administrations, and enterprises

relying on digital technologies, should have access to extremely high - gigabit - connectivity (allowing users to download/upload 1 gigabit of data per second) [by 2025].

- All European households, rural or urban, should have access to connectivity offering a download speed of at least 100 Mbps, which can be upgraded to Gbps [by 2025].
- All urban areas as well as major roads and railways should have uninterrupted 5G coverage, the fifth generation of wireless communication systems. As an interim target, 5G should be commercially available in at least one major city in each EU Member State by 2020.<sup>158</sup>

As shown within the previous sections of this study, as of today most of the Member States' NBPs are not prepared yet to achieve these goals. Regarding the connection of socio-economic drivers, there is still room for improvement for most Member States. Although several Member States realized the importance of connecting centres of education, business parks and public administrations, some Member States have not yet fully recognized the importance this issue or defined specific measures to increase their connectivity. The demand by business and institutional consumers is, however, of increasing importance. Often, these potent drivers have socio-economic influence far beyond their actual reach as they act as multipliers. Whenever students, employees or customers have access to these facilities and experience the possibilities of modern digital infrastructures and corresponding web applications, they are more likely to demand better connections for their private life as well. This in turn, reduces the take-up risk of operators which offer high-end solutions especially in areas where deployment of digital infrastructures is deemed to be economically not viable. Hence, for this objective to be attained, a stronger focus on these socio-economic drivers will be necessary in the Member States' future NBPs.

Regarding the connectivity target, the situation is somewhat similar. Currently, most Member States would struggle to meet these objectives, even considering the extended timeframe. However, there are several Member States that currently invest in future proof fiber (e.g. Baltic countries, Sweden, Portugal) networks or have extensive cable networks available (e.g. Netherlands, Denmark, Malta) that are also able to deliver the updated connectivity target. But on the other hand, there are also some Member States that are dependent on xDSL technologies where it is at least doubtful, if 100 Mbps can be delivered reliably for the majority of users. Thus, in order to improve connectivity and achieve full coverage with 100 Mbps across Europe, future NBPs need to provide appropriate incentives and

---

<sup>158</sup> [http://europa.eu/rapid/press-release\\_IP-16-3008\\_en.htm](http://europa.eu/rapid/press-release_IP-16-3008_en.htm)

means for increasing investment in broadband infrastructure roll-out. Local actors as well as the private sector have to be included and in turn have to make use of such measures.

Regarding the 5G target, the perspectives are relatively good. Commercial roll-out of 5G will start within the next few weeks and commercial availability in one city per Member State will probably be possible. On the other hand, uninterrupted service along major roads and railways will again be a challenge. If this challenge may be mastered is unclear, as there are no commercial experiences with 5G in Europe yet.

In any case, the key for achieving current and future targets will be decided today. Europe's digital future will heavily depend on scalable and future-proof technologies that are able to fulfil all future demands alike. If the Member States incentivize the deployment of these technologies, Europe's digital infrastructure can become a competitive advantage and support Europe's societal and economic progress alike.

## 11 List of Abbreviations

2G	2 <sup>nd</sup> Generation Wireless Mobile Technology
3G	3 <sup>rd</sup> Generation Wireless Mobile Technology
4G	4 <sup>th</sup> Generation Wireless Mobile Technology
5G	5 <sup>th</sup> Generation Wireless Mobile Technology
ADB	Tender Database - Germany (Ausschreibungsdatenbank)
ADF	Association of French Counties (Assemblée des Départements de France)
ADSL(2)(+)	Asymmetric Digital Subscriber Line(2)(+)
Agcom	Authority for Communication Granting - Italy (L'Autorità per le garanzie nelle comunicazioni)
AgID	Digital Agency of Italy (Agenzia per l'Italia Digitale)
AKOS	Agency for Communication Networks and Services - Slovenia
ANACOM	National Communications Authority - Portugal (Autoridade Nacional de Comunicações)
ANCOM	Authority for Management and Regulation in Communications - Romania
AO(s)	Alternative Operator(s)
ARCEP	French Regulation Authority of Electronic Communication and Post (L'Autorité de régulation des communications électroniques et des postes)
ARF	Association of French Regions (Association des Régions de France)
AT	Austria
AVICCA	Association of local broadband connected communities - France (Association des Villes et Collectivités pour les Communications Electroniques et l'Audiovisuel)
BBB	Federal Broadband Bureau - Germany (Breitbandbüro des Bundes)
BDUK	Broadband Delivery UK
BE	Belgium
BEREC	Body of European Regulators for Electronic Communications

BG	Bulgaria
BGN	Bulgarian Lev (currency)
BIPT	Belgian Institute for Postal Services and Telecommunications - Belgium (Institut belge des services postaux et des télécommunications / Belgisch Instituut voor postdiensten en telecommunicatie)
BMVI	Federal Ministry of Transport and Digital Infrastructure - Germany (Bundesministerium für Verkehr und digitale Infrastruktur)
BMVIT	Ministry for Transport, Innovation and Technology - Austria (Bundesministerium für Verkehr, Innovation und Technologie)
BMWi	Federal Ministry for Economic Affairs and Energy - Germany (Bundesministerium für Wirtschaft und Energie)
BNetzA	Federal Agency for Electricity, Gas, Telecommunications, Post and Railway - Germany (Bundesnetzagentur)
BT	British Telecom (private company)
CAPEX	Capital expenditures
CATV	Community Access Television (cable television)
CEF	Connecting Europe Facility
CETIN	Czech Telecommunication Infrastructure - private company (Česká telekomunikační infrastruktura)
CIPE	Interministerial Committee for Economic Programming - Italy (Comitato Interministeriale per la Programmazione Economica)
CIS	Centralized Information System
CNMC	National Commission for Markets and Competition on electronic and audiovisual communications - Spain
COBUL	Committee for the dissemination of Ultrafast Broadband - Italy (Comitato per la diffusione della Banda Ultralarga)
ComReg	Commission for Communications Regulation - Ireland
CRC	Communications Regulatory Commission - Bulgaria
CTU	Czech Telecommunication Office
CY	Cyprus
CYTA	Cyprus Telecommunications Authority (operator)

CZ	Czech Republic
CZK	Czech Koruna (currency)
DAE	Digital Agenda Europe
DBO	Design Build and Operate
DCENR	Department of Communications, Energy and Natural Resources - Ireland
DCLG	Department for Communities and Local Government - United Kingdom
DCMS	Department for Culture, Media and Sport- United Kingdom
DE	Germany
DEC	Department of Electronic Communications - Cyprus
Defra	Department for Environment, Food and Rural Affairs - United Kingdom
DK	Denmark
DKK	Danish Krone (currency)
DOCSIS	Data Over Cable Service Interface Specification
(x)DSL	Digital Subscriber Line
DSM	Digital Single Market
E.A. ECNIS	Electronic Communication Networks and Information Society - Bulgaria
EAFRD	European Agricultural Fund for Rural Development
EBRD	European Bank for Reconstruction and Development
EE	Estonia
EEK	Estonian Kroon (currency)
EETT	National Telecommunications and Posts Commission - Greece
EFSI	European Fund for Strategic Investment
EL	Greece
ELASA	Estonian Broadband Development Foundation
ELFA	European Local Fiber Alliance
ENGAGE	Enhancing Next Generation Access Growth in Europe (Project)
ERDF	European Regional Development Fund
ES	Spain
ESIF	European Structural Investment Funds
EU	European Union
EUR	Euro (currency)
FFTP	Fibre to the Premises



FI	Finland
FICORA	Finnish Regulatory Authority (Viestintävirasto)
FIRIP	Industrial Federation of Public Initiative Networks - France (Fédération des Industriels des Réseaux d'Initiative Publique)
FNCCR	National Federation of Public Service Providers - France (Fédération Nationale des Collectivités Concédantes et Régies)
FPS	Federal Public Service Economy, S.M.E.s, Self-employed and Energy - Belgium
FR	France
FSN	National Fund for the Digital Society - France (Fond National pour la Société Numérique)
FTTB	Fibre to the Building
FTTC	Fibre to the Curb
FTTH	Fibre to the Home
FTTx	Fibre to the x
FWA	Fixed Wireless Access
GAK	Joint Task on Agricultural Structures and Coastal Protection - Germany (Gemeinschaftsaufgabe Verbesserung der Agrarstruktur und des Küstenschutzes)
GBER	General Block Exemption Regulation
Gbps	Gigabits per second
GHz	Gigahertz
GIS	Geographic Information System
GPON	Gigabit Passive Optical Networks
GSM	Global System for Mobile Communications
HAKOM	Croatian regulatory authority for network industries - Croatia
HFC	Hybrid Fibre-Coaxial
HH	Household
HR	Croatia
HRK	Croatian Kuna (currency)
HSDPA	High Speed Downlink Packet Access
HSPA(+)/ H(+)	(Evolved) High Speed Packet Access

HU	Hungary
HUF	Hungarian Forint (currency)
ICT	Information and communications technology
ICT UNIE	Information Technology and Telecommunication Association - Czech Republic
IE	Ireland
ILR	Luxembourgian Regulations Institute (Institut Luxembourgeois de Régulation)
IMT	International Mobile Telecommunications
IoT	Internet of Things
IS	Information System
ISO	International Organization for Standardization
ISP(s)	Internet Service Provider(s)
IST	Information Systems Technology
IT	Italy
ITL	Estonian Association of Information Technology and Telecommunications
IVPK	Information Society Development Committee - Lithuania
KLIC	Cable and Pipeline Information Centre - Netherlands
KLIM-CICC	Federal Duct and Cable Contact Point - Belgium, Wallonia and Brussels (Federaal Kabels en Leidingen Informatie Meldpunt / Contact federal Informations Câbles et Conduites)
KLIP	Cable and Duct Information Portal - Belgium, Flanders (Kabel- en Leidinginformatieportaal)
LAG	Local Action Group
LDR	Less Developed Region
LEC	Law for Electronic Communication - Bulgaria
LIA	Latvian Internet Association
LIKTA	Latvian Information and Communications Technology Association
LLU	Local Loop Unbundling
LSA	Learning Support Assistant
LSP	Law on Spatial Planning - Bulgaria
LT	Lithuania
LTE	Long-Term Evolution

LU	Luxembourg
LV	Latvia
LVL	Latvian Lats (currency)
LVRTC	Latvia State Radio and Television Centre (Latvijas valsts radio un televīzijas centrs)
M2M	Machine to Machine
MAN	Metropolitan Area Network
Mbps	Megabits per second
MCA	Malta Communications Authority
MCSI	Ministry of Communications and Information Society - Romania
MDA	Ministry of Digital Affairs - Poland
MDR	More Developed Region
MDU	Multi-Dwelling Unit
MDVRR	Ministry of Transport, Construction and Regional Development of the Slovak Republic
MHz	Megahertz
MISE	Ministry of Economic Development - Italy (Ministero dello Sviluppo Economico)
MITA	Malta Information Technology Agency
MND	Ministry of National Development of the Republic of Hungary
MNO	Mobile Network Operator
MS	Member State
MT	Malta
MTITC	Ministry of Transport and Communications - Bulgaria
MVNO	Mobile Virtual Network Operator
NASES	National Agency for Networking and Electronic Services - Slovakia
NBP	National Broadband Plan
NGA	Next Generation Access
NGN	Next Generation Network
NGO	Non-governmental organization
NL	Netherlands
NMHH	National Media and Infocommunications Authority - Hungary

NP-BBI	National Programme for Broadband Backhaul Infrastructure - Croatia
NPRSNG	National NGN Development Plan - Czech Republic (Národní plan rozvoje sítí nové generace)
NRA	National Regulatory Authority
Ofcom	Office of Communications - United Kingdom
OP	Operational Programme
OPRD	Operational Programme Regional Development - Bulgaria
PL	Poland
PNBL	National Broadband Plan - Italy (Piano Nazionale Banda Larga)
PNBUL	National ultrafast-Broadband Plan - Italy (Piano Nazionale Banda Ultra Larga)
PON	Passive Optical Network
(M)POP	(Minimum) Point of Presence
PPDR	Public Protection and Disaster Relief
PPP	Public–private partnership
PSTN	Public Switched Telephone Network
PT	Portugal
PTS	Swedish Post and Telecom Agency (Post- och telestyrelsen)
PUC	Public Utility Commission - Latvia
R&D	Research and Development
RCA	The Radio Communication Agency - Netherlands
RCBF	Rural Community Broadband Fund - United Kingdom
RO	Romania
RRT	Communications Regulatory Authority of the Republic of Lithuania
RSPP	Radio Spectrum Policy Programme
SE	Sweden
SEK	Swedish Krona (currency)
SETSI	Secretary of State for Telecommunications and Information Society - Spain
SI	Slovenia
SIM	Subscriber Identity Module

SJSC	State Joint-Stock Company
SK	Slovakia
SLU	Sub Loop Unbundling
SMC	Communications and Media Service - Luxembourg
SME(s)	Small and medium-sized enterprise(s)
SMP	Significant Market Power
SOP-IEC	Sectoral Operational Programme-Increase of Economic Competitiveness - Romania
SSSI(s)	Site(s) of Special Scientific Interest - United Kingdom
SUMIN	Ministry of Transport and Communications of the Republic of Lithuania
TDD	Time-division duplexing
TEN-T	Trans-European Transport Networks
TIFF	Tagged Image File Format
TKG	Telecommunications Act - Austria/Germany (Telekommunikationsgesetz)
TLC	Telecommunication(s)
TSM	Telecoms Single Market
UHF	Ultra High Frequency
UK	United Kingdom
UKE	Office of Electronic Communications - Poland
UMTS	Universal Mobile Telecommunications System
USO	Universal Service Obligation
VAT	Value Added Tax
VDSL	Very-high-bit-rate Digital Subscriber Line
VULA	Virtual Unbundled. Local Access
WCDMA	Wideband Code Division Multiple Access
WiMAX	Worldwide Interoperability for Microwave Access
WLAN	Wireless Local Area Network

## 12 List of References

- Agenda Portugal Digital (Diário da República, 1.ª série — N.º 74 — 16 de abril de 2015). Source: <https://dre.pt/application/file/66991457> (2015)
- Analysis Mason and Tech4i2: The socio-economic impact of bandwidth. (2013)
- Analysis Mason: Broadband network investment three actions for regulators and policy-makers. (2015)
- Analysis Mason: Report for ECTA – European Competitive Telecommunications Association - The digital single market and telecoms regulation going forward. (2015)
- Analysis Mason: Report for the Broadband Commission - Broadband Policy Briefing Paper. (2015)
- Analysis Mason: Tech companies offer an alternative to PPP investments in broadband networks. (2015)
- Bourreau, Marc, Pinar Doan, and Matthieu Manant: A Critical Review of the "Ladder Investment" Approach. *Telecommunications Policy* 34(11):683-696. (2010)
- Broadband Commission for Digital Development: The State of Broadband 2015: Broadband as a Foundation for Sustainable Development. (2015)
- Broadband Strategy 2020 (Breitbandstrategie 2020) - Austria. Source: <https://www.bmvit.gv.at/service/publikationen/telekommunikation/downloads/breitbandstrategie2020.pdf> (2014)
- Broadband Strategy for Sweden / Swedish Digital Agenda (IT i Människans Tjänst - en digital agenda för Sverige). Source: [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4861](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4861) (2009/2011)
- Cyprus Broadband Plan 2016 – 2020. Source: [http://www.mcw.gov.cy/mcw/dec/dec.nsf/All/AA8BA9C426E54929C2257FBE0023CF39/\\$file/Cyprus\\_Broadband\\_Plan.pdf?OpenElement](http://www.mcw.gov.cy/mcw/dec/dec.nsf/All/AA8BA9C426E54929C2257FBE0023CF39/$file/Cyprus_Broadband_Plan.pdf?OpenElement) (2016)
- Delft University of Technology: Explaining Telecommunications Performance across the EU. (2014)
- Delft University of Technology: The policy framework for electronic communications: an EU benchmark 2012. (2014)
- Digital Agenda 2014-2017 (Digitale Agenda 2014-2017) - Germany. Source: [https://www.digitale-agenda.de/Content/DE/\\_Anlagen/2014/08/2014-08-20-digitale-agenda.pdf;jsessionid=45ADB12CE6E02B57E51889B1B82839E2.s4t1?\\_blob=publicationFile&v=6](https://www.digitale-agenda.de/Content/DE/_Anlagen/2014/08/2014-08-20-digitale-agenda.pdf;jsessionid=45ADB12CE6E02B57E51889B1B82839E2.s4t1?_blob=publicationFile&v=6) (2014)
- Digital Agenda 2020 for Estonia. Source: [https://www.mkm.ee/sites/default/files/digital\\_agenda\\_2020\\_estonia\\_engf.pdf](https://www.mkm.ee/sites/default/files/digital_agenda_2020_estonia_engf.pdf) (2014)
- Digital Agenda Netherlands (ICT voor innovatie en economische groei). Source: [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4217](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4217) (2011)
- Digitale Agenda - Vernieuwen, Vertrouwen, Versnellen - Netherlands. Source: <https://www.rijksoverheid.nl/onderwerpen/ict/documenten/rapporten/2016/07/05/digitale-agenda-vernieuwen-vertrouwen-versnellen> (2016)

Digital Belgium – Plan for Ultrafast Internet in Belgium (2015-2020) (Digital Belgium, Plan Voor Ultrafast Internet in België). Source: <http://www.decree.be/en/plan-ultrafast-internet-belgium> (2015)

Digital Czech Republic V.2.0 the way to the digital economy (Digitální Česko v. 2.0 Cesta k digitální ekonomice Note). Source: [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4833](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4833) (2013)

Digital Growth Policy Statement / the action plan “Better broadband and mobile coverage in Denmark”. Source: <http://evm.dk/english/publications/2013/13-05-29-denmarks-digital-growth> (2013)

Digital Malta 2014 – 2020. Source: <https://digitalmalta.gov.mt/> (2014)

Directive 2014/61/CE on broadband cost reduction in a nutshell. (2014)

European Commission: Impact Assessment - Accompanying the document Proposal for a Regulation of the European Parliament and of the Council on measures to reduce the cost of deploying high-speed electronic communications networks - SWD(2013) 73 final. (26.03.2013)

European Commission: A Digital Agenda for Europe - COM(2010) 245 final. (19.5.2010)

European Commission: A Digital Single Market Strategy for Europe - COM(2015) 192 final. (6.05.2015)

European Commission: Commission Staff Working Document on the Implementation of National Broadband Plans - SWD(2012) 68 final/2. (23.03.2012)

European Commission: Digital Scoreboard / Digital Economy and Society Index (DESI). Source: <https://ec.europa.eu/digital-single-market/en/digital-scoreboard> (2016)

European Commission: European Broadband: investing in digitally driven growth - COM(2010) 472 final. (19.5.2010)

European Commission: European Digital Progress Report. Source: [http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc\\_id=15806](http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=15806) (2016)

European Commission: Guidance on Ex ante Conditionalities for the European Structural and Investment Funds PART II. (2014)

European Commission: Guide to High-Speed Broadband Investment. (2014)

European Commission: ICT Monitoring Tool. Source: <http://s3platform.jrc.ec.europa.eu/ict-monitoring> (2016)

European Commission: Implementation of the EU regulatory framework for electronic communication - SWD(2015) 126 final. (19.6.2015)

Eurostat regional yearbook 2015. (2015)

France Very High Speed (France Très Haut Débit). Source: [http://francethd.fr/documents\\_reference/Cahier-des-charges-PFTHD-2015.pdf](http://francethd.fr/documents_reference/Cahier-des-charges-PFTHD-2015.pdf) (2015)

Government Decision HG 414/2015 (Romanian Program for the implementation of the National Plan for NGN infrastructure development). Source: [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4214](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4214) (2015)

i2010 High Level Group: Benchmarking Digital Europe 2011-2015 - a conceptual framework. (27.10.2009)

IHS Inc. and Valdani Vicari & Associati: Broadband Coverage in Europe 2014 - Mapping progress towards the coverage objectives of the Digital Agenda. (2015)

Lemstra, Wolter and Melody, William H.: The Dynamics of Broadband Markets in Europe Realizing the 2020 Digital Agenda. (2015)

National Broadband Infrastructure Plan for Next Generation Access (2014-2020) -Bulgaria. Source: [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=7487](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=7487) (2014)

National Broadband Plan 2012 / the updated Intervention Strategy 2015 - Ireland. Source: <http://www.dcenr.gov.ie/communications/SiteCollectionDocuments/Broadband/National%20Broadband%20Plan.pdf> (2012/2015)

National broadband strategy/ Digital Agenda for 2011-2020 - Finland. Source: [ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=3264](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=3264) (2008/2011)

National Infocommunication Strategy 2014-2020 - Hungary. Source: [http://www.kormany.hu/download/5/ff/70000/NIS\\_EN\\_clear.pdf](http://www.kormany.hu/download/5/ff/70000/NIS_EN_clear.pdf) (2014)

National Plan Next Generation Broadband Access 2014-2020 - Greece. Source: <http://www.yme.gr/getfile.php?id=5836> (2015)

National strategy for very highspeed networks – Very highspeed broadband for all - Luxembourg. Source: [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=4854](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4854) (2010)

OECD Science, Technology and Industry Policy Papers No. 26: Development of High-speed Networks and the Role of Municipal Networks. (2015)

Ofcom: The Communications Market Report. (2015)

Official Journal of the European Union - L155/1. (23.05.2014)

Official Journal of the European Union - L155/11. (23.05.2014)

Official Journal of the European Union - L155/9. (23.05.2014)

Plan for the development of next generation broadband networks until 2020 (updated in March 2016) - Slovenia. Source: [http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Informacijska\\_druzba/NGN\\_2020.pdf](http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Informacijska_druzba/NGN_2020.pdf) (2016)

Plan for the Next Generation of Internet Development for 2014- 2020 in Republic of Lithuania. Source: <https://www.e-tar.lt/portal/en/legalAct/7e1fdab0600411e4bad5c03f56793630> (2014)

Polish National Broadband Plan. Source: [https://mac.gov.pl/files/narodowy\\_plan\\_szerokopasmowy\\_-\\_08.01.2014\\_przyjety\\_przez\\_rm.pdf](https://mac.gov.pl/files/narodowy_plan_szerokopasmowy_-_08.01.2014_przyjety_przez_rm.pdf) (2014)

SamKnows Limited: Quality of Broadband Services in the EU. (2013)

South East Europe - Transnational Cooperation Programme: BASIC Private DBO MODEL. (2013)



Strategic document for Digital Growth and Next Generation Access Infrastructure 2014-2020 - Slovakia. Source: [http://www.informatizacia.sk/ext\\_dok-strategicky\\_dokument\\_2014\\_2020\\_en/16622c](http://www.informatizacia.sk/ext_dok-strategicky_dokument_2014_2020_en/16622c) (2014)

Strategy for Broadband Development in the Republic of Croatia for 2012-2015. Source: [http://www.mppi.hr/UserDocsImages/w%20StrategyBB%205\\_12.pdf](http://www.mppi.hr/UserDocsImages/w%20StrategyBB%205_12.pdf) (2011)

Strategia italiana per la banda ultralarga ("Piano nazionale banda ultra larga") - Italy. Source: [http://www.governo.it/sites/governo.it/files/strategia\\_banda\\_ultralarga.pdf](http://www.governo.it/sites/governo.it/files/strategia_banda_ultralarga.pdf) (2015)

The conception of next generation broadband electronic communication network development 2013-2020 (Nākamās paaudzes platjoslas elektronisko sakaru tīklu attīstības koncepcija 2013-2020 gadam) - Latvia: [http://www.vvc.gov.lv/export/sites/default/docs/LRTA/Citi/Summary\\_of\\_the\\_Concept\\_for\\_the\\_Development\\_of\\_Next\\_Generation.doc](http://www.vvc.gov.lv/export/sites/default/docs/LRTA/Citi/Summary_of_the_Concept_for_the_Development_of_Next_Generation.doc) (2012)

The Digital Agenda for Spain - Telecommunications and Ultra-fast Networks Plan. Source: <http://www.agendadigital.gob.es/digital-agenda/Documents/digital-agenda-for-spain.pdf> (2013)

The World Bank: Building Broadband - Strategies and Policies For Developing The World. (2010)

The World Bank: Urban population (% of total). Source: <http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS> (2015)

UK Next Generation Network Infrastructure Deployment Plan, digital communications infrastructure strategy. Source: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/418567/UK\\_Next\\_Generation\\_Network\\_Infrastructure\\_Deployment\\_Plan\\_March\\_15.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/418567/UK_Next_Generation_Network_Infrastructure_Deployment_Plan_March_15.pdf) (2015)

Van Dijk Management Consultants: Broadband Internet Access Cost (BIAC) 2015

## 13 Annex

Member State	NBP Source	Member State	NBP Source
Austria	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4828">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4828</a>	Italy	<a href="http://www.governo.it/sites/governo.it/files/strategia_banda_ultralarga.pdf">http://www.governo.it/sites/governo.it/files/strategia_banda_ultralarga.pdf</a>
Belgium	<a href="http://www.digitalbelgium.be/en#digital-agenda">http://www.digitalbelgium.be/en#digital-agenda</a>	Latvia	<a href="http://mk.gov.lv/lv/mk/tap/?pid=40249838">http://mk.gov.lv/lv/mk/tap/?pid=40249838</a>
Bulgaria	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=7487">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=7487</a>	Lithuania	<a href="http://www3.lrs.lt/pls/inter3/dokpaieska.show_doc_l?p_id=467638&amp;p_tr2=2">http://www3.lrs.lt/pls/inter3/dokpaieska.show_doc_l?p_id=467638&amp;p_tr2=2</a>
Croatia	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15189">https://ec.europa.eu/digital-agenda/news-redirect/15189</a>	Luxembourg	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15195">https://ec.europa.eu/digital-agenda/news-redirect/15195</a>
Cyprus	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15178">https://ec.europa.eu/digital-agenda/news-redirect/15178</a>	Malta	<a href="http://www.digitalmalta.gov.mt/en/Pages/Content/DMDownload.aspx">http://www.digitalmalta.gov.mt/en/Pages/Content/DMDownload.aspx</a>
Czech Republic	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15180">https://ec.europa.eu/digital-agenda/news-redirect/15180</a>	Netherlands	<a href="http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4217">http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4217</a> <a href="https://www.rijksoverheid.nl/onderwerpen/ict/documenten/rapporten/2016/07/05/digitale-agenda-vernieuwen-vertrouwen-versnellen">https://www.rijksoverheid.nl/onderwerpen/ict/documenten/rapporten/2016/07/05/digitale-agenda-vernieuwen-vertrouwen-versnellen</a>
Denmark	<a href="http://www.evm.dk/aktuelt/pressemeddelelser/2013/13-03-13-bedre-bredbaand-og-mobildaekning-i-hele-danmark">http://www.evm.dk/aktuelt/pressemeddelelser/2013/13-03-13-bedre-bredbaand-og-mobildaekning-i-hele-danmark</a>	Poland	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15199">https://ec.europa.eu/digital-agenda/news-redirect/15199</a>
Estonia	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15183">https://ec.europa.eu/digital-agenda/news-redirect/15183</a>	Portugal	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15200">https://ec.europa.eu/digital-agenda/news-redirect/15200</a>
Finland	<a href="http://www.lvm.fi/en/broadband">http://www.lvm.fi/en/broadband</a>	Romania	<a href="http://ec.europa.eu/digital-agenda/news-redirect/14051">http://ec.europa.eu/digital-agenda/news-redirect/14051</a>
France	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15186">https://ec.europa.eu/digital-agenda/news-redirect/15186</a>	Slovakia	<a href="http://www.telecom.gov.sk/index/index.php?ids=8591&amp;lang=en">http://www.telecom.gov.sk/index/index.php?ids=8591&amp;lang=en</a>
Greece	<a href="http://www.yme.gr/getfile.php?id=5836">http://www.yme.gr/getfile.php?id=5836</a>	Slovenia	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15204">https://ec.europa.eu/digital-agenda/news-redirect/15204</a>
Germany	<a href="https://ec.europa.eu/digital-agenda/news-redirect/19213">https://ec.europa.eu/digital-agenda/news-redirect/19213</a>	Spain	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15185">https://ec.europa.eu/digital-agenda/news-redirect/15185</a>
Hungary	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15188">https://ec.europa.eu/digital-agenda/news-redirect/15188</a>	Sweden	<a href="http://ec.europa.eu/digital-agenda/news-redirect/15202">http://ec.europa.eu/digital-agenda/news-redirect/15202</a>

<b>Ireland</b>	<a href="https://ec.europa.eu/digital-agenda/news-redirect/15191">https://ec.europa.eu/digital-agenda/news-redirect/15191</a>	<b>United Kingdom</b>	<a href="https://www.gov.uk/government/publications/the-digital-communications-infrastructure-strategy/the-digital-communications-infrastructure-strategy">https://www.gov.uk/government/publications/the-digital-communications-infrastructure-strategy/the-digital-communications-infrastructure-strategy</a>
----------------	---	-----------------------	---

Table 68: National Broadband Plans of the Member States: Source

### Austria – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		✓x	How are the measures addressed ?	✓x	Implementation of measures addressed if Yes, concrete measures	✓x	Indicators and time schedule addressed if Yes, concrete measures	✓x	Responsibilities and monitoring mechanism addressed if Yes, concrete measures
REGULATORY & ORGANISATIONAL MEASURES	Organization & Management	✓	<ul style="list-style-type: none"> <li>– Definition of the roles and responsibilities of the main actors</li> <li>– Stakeholder participation addressed as a prerequisite for the strategy success</li> <li>– Introducing coordination measures</li> </ul>	x		x		x	
	Horizontal and vertical coordination measures as well as involvement of stakeholders	✓	<ul style="list-style-type: none"> <li>– General measures on regular monitoring of the strategy</li> </ul>	x		✓	<ul style="list-style-type: none"> <li>– Annual evaluation and update of the progress of the programme</li> <li>– Strategic and financing evaluation measures are addressed</li> </ul>	✓	The Ministry of transport, innovation and technology as the dedicated monitoring authority
	Regulation (i.e. access obligations, regulated prices and reference offers)	✓	TKG (the telecommunication act) as the main binding regulatory framework to be considered in all deployment practices	✓	Regulatory measures on open access	x		x	

## Austria – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP								
		How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed							
Topics		√x	if Yes, concrete measures	√x	if Yes, concrete measures	√x	if Yes, concrete measures					
SUPPLY SIDE MEASURES	Funding and financing	Measures/Plan for public investments	√	Public investments from different sources are addressed, especially in less developed areas	√	Thematic funding programmes i.e. – Infrastructure investment in rural areas – Use of broadband for research and innovation – Empty ducts funding programme – etc.	√	The financial capacity, focus areas, as well as timelines are addressed	√	Ministry of transport, innovation and technology as the main controlling body for creating the prerequisite, frameworks and cooperation environment together with other participating sectors		
		Available budgetary resources (their share & adequacy)	√	Different types of financial sources in accordance with the development programmes are addressed	√	e.g. explanation of the financial support from the EIB for FTTH deployments as well as other funding programmes for broadband development in rural areas	x		x			
		Description of potential/preferred business models	√	Introduction of some preferred/potential business models with the focus on less developed areas	x		x		x			
		Measures to stimulate private investment	√	Provision of a suitable conditions for private investment is a priority	√	e.g. providing public financial support, net neutrality and open access provisions, investment risk assessment and sharing of risk by adopting appropriate cooperation models	x		x			
		Investment priorities (i.e. in rural & remote areas)	√	Improving broadband deployment in less developed regions	x		x		x			
		Promotional measures	x		x		x		x			
		Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	√	Mobile broadband such as 4G (LTE) as a potential bridging solution	√	Providing conditions for spectrum trade – Using public financial sources & searching for potential funding to provide access in remote areas (as well as new frequency auctions/releases) – Cooperation regarding European frequency policy	x		x		√	The Ministry of transport, innovation and technology as the main responsible authority
		Fixed broadband technology focus/priority	√	Technology neutrality as a general condition, but with preference on fiber optic as a sustainable solution for long term development	√		x		x		x	

## Austria – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
		Vx	How are the measures addressed ?	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures
TRANSPARENCY MEASURES	Mapping system	V	Broadband atlas as the main service mapping tool to be publicly available	x		x		x	
		V	Infrastructure mapping showing the existing private and public networks and planned investments	x		x		x	
		V	Use of existing infrastructure	V	Further development of relevant regulation	x		V	The Ministry of transport, innovation and technology as the main responsible authority
	Cost reduction	V	Coordination of civil works	V	Infrastructure database (for existing and future planned networks) – Provision of new construction measures	x		x	
		x	Permit granting and electronic counters	x		x		x	
		x	Building readiness	x		x		x	
DEMAND SIDE MEASURES	x	Public services connectivity (i.e. schools, libraries etc.)	x		x		x		
	V	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)		<ul style="list-style-type: none"> <li>– Lifelong learning programmes</li> <li>– Establishment of ICT competence centers in regions (financed by private companies and public sources) to stimulate the use of ICT</li> <li>– Establishment of the competence center of Internet society</li> <li>– Information and communication events</li> <li>– A specific funding programme focusing on the use of ICT in research and marketing</li> <li>– Supportive measures for socially disadvantaged people in the form of credits &amp; charge free access to public networks</li> <li>– Programmes for more attractive ICT education</li> </ul>	x		V	The Ministry of transport, innovation and technology, competence center of internet society as well as the regional ICT competence centers as the main responsible/coordinator authorities	
		Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)				x		V	

### Belgium – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
Topics		√x		√x	if Yes, concrete measures	√x	if Yes, concrete measures	√x	if Yes, concrete measures
REGULATORY & ORGANISATIONAL MEASURES	Horizontal and vertical coordination measures as well as involvement of stakeholders	√		x		x		√	Deputy Prime Minister and Minister of Digital Agenda and Telecom as the main responsible body for implementation and monitoring of the strategy (with the support of FPS Economy)
	Monitoring and updating mechanism (i.e. interim assessments)	x		x		x		x	
	Regulation (i.e. access obligations, regulated prices and reference offers)	√		x		x		x	

### Belgium – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		√x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
				√x	if Yes, concrete measures	√x	if Yes, concrete measures		√x
SUPPLY SIDE MEASURES	Measures/Plan for public investments	x		x		x		x	
	Available budgetary resources (their share & adequacy)	x		x		x		x	
	Description of potential/preferred business models	x		x		x		x	
	Measures to stimulate private investment	√	General provisions and statements	x		x		x	
	Investment priorities (i.e. in rural & remote areas)	x		x		x		x	
	Promotional measures	x		x		x		x	
Technology	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	√		√	<ul style="list-style-type: none"> <li>– Releasing spectrum via frequency auctions</li> <li>– Taxation of the use of masts and pylons as an obstacle to be solved (a public consultation is proposed by the strategy)</li> <li>– Informing citizens better about the use of satellite</li> </ul>	x		x	
	Fixed broadband technology focus/priority	√	Technology neutral with the preference of fiber technologies for creating a basis for 5G technologies	x		x		x	



## Belgium – All measures defined by NBP

Topics		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
				√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures		
TRANSPARENCY MEASURES	Mapping system	Coverage and service mapping tool	√ Provision of a comprehensive mapping system	x	√	√	√	The NRA as the main responsible body	
		Infrastructure mapping showing the existing private and public networks and planned investments	√ Mapping the existing infrastructure and planned work	x	x	x	x		
	Cost reduction	Use of existing infrastructure	√ Use of existing infrastructure by integration of the existing cartographic instruments	√	√	x	x	x	
		Coordination of civil works	√ Co-ordination of roadworks and share of costs by mapping planned works	√	√	x	x	x	
		Permit granting and electronic counters	√ Improving inefficiencies in the administrative process of broadband development	√	√	x	x	x	
		Building readiness	√ Fiber ready buildings as a measure in the strategy	√	√	x	x	x	
DEMAND SIDE MEASURES	Demand stimulation	Public services connectivity (i.e. schools, libraries etc.)	√ Providing access to schools, hospitals and libraries as a priority in the strategy	x	x	x	x		
		Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	√ The strategy target is focused on stimulating the subscription of 1 Gbps and more for half of the population	x	x	x	x		
	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	√ Several measures addressed, aiming at enhancing the benefits of superfast internet, such as: – Stimulating innovative research projects – Informing and involving SMEs regarding new services – Reinforcing the trust of users – Stimulating competition	x	x	x	x	x		

### Bulgaria – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
Topics		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	Horizontal and vertical coordination measures as well as involvement of stakeholders	V	– Generally addressing the important role of municipal administrations in coordination and approval of investment projects – General definition of the roles and responsibilities of the stakeholders	x		x		x	
		Monitoring and updating mechanism (i.e. interim assessments)	x		x		x		x	
	Regulation (i.e. access obligations, regulated prices and reference offers)	V	Overview of the main EU and national regulatory frameworks for broadband deployment	V	– LEC (Law for Electronic Communication) as the main regulatory reference for safeguarding a competition environment – The NBP also provides proposals on amendments in current legislation	x		x		V

## Bulgaria – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		√x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
				√x	if Yes, concrete measures	√x	if Yes, concrete measures		√x
Supply Side Measures	Funding and financing	√	Evaluation of the costs for investment priorities using public funding	√	Quantitative assessment of the investment needs in accordance with types of settlement	x		x	
		x	Available budgetary resources (their share & adequacy)	x		x		x	
		√	Description of potential/preferred business models	x		x		x	
		√	Measures to stimulate private investment	√	i.e. risk assessment and distribution of commercial and technological risks among participating actors	x		x	
		√	Investment priorities (i.e. in rural & remote areas)	√	6 investment priorities are set: A. Development of existing cable access networks B. Building FTTH optical access networks (in white and grey areas) C. Introduction of wireless NGA technologies D. Development of optical and wireless access (NGA) networks (last mile) E. Development of optical and wireless access (>100 Mbps) for businesses F. Development of optical and wireless access (>100 Mbps) for public institutions	√		x	– Technology focus in each priority, targeted speed in relation to settlement types – Deadlines for each investment priority are set
Technology	Promotional measures	x		x		x		x	
	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	√	Wireless technologies are considered as complementary/bridging solutions addressed as one of the 6 priority lines	x		x		x	
	Fixed broadband technology focus/priority	√	– Technology neutrality as a rule addressed in the Law of Electronic Communications considered binding by the NBP – Introduction of potential technologies, their benefits & implementation requirements (i.e. deployment price comparison etc.)	x		x		x	

## Bulgaria – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
		✓x	✓	✓x if Yes, concrete measures	✓	✓x if Yes, concrete measures	✓x if Yes, concrete measures			
TRANSPARENCY MEASURES	Coverage and service mapping tool	✓	Development and maintenance of the mapping database (using data from different utility providers)	✓	Additional legislative decisions in LEC, LSP, and the Law on Cadastre and Property Register as the main supporting measures for implementation of the mapping system	x		✓	The NRA as the responsible authority, with the support of the Ministry of Investment Planning and Agency for Geodesy, Cartography and Cadastre	
		✓	Infrastructure mapping showing the existing private and public networks and planned investments	✓					✓	
	Cost reduction	Use of existing infrastructure	✓	The cost reduction measures addressed in the NBP	✓	Establishment of the infrastructure database for coordination activities	x		x	
		Coordination of civil works	✓		✓		x		x	
		Permit granting and electronic counters	✓		✓	Establishment of the unified information access point	x		x	
	Building readiness	✓		✓	Introducing building readiness concept	x		x		
	DEMAND SIDE MEASURES	Public services connectivity (i.e. schools, libraries etc.)	✓	Developing a fiber optic broadband infrastructure for all public institutions as a target in the NBP	✓	Development of optical and wireless access (>100 Mbps) to public institutions in white, grey and black areas	✓	Suitable technologies in accordance with settlement types are introduced	✓	
Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)		✓	– Addressing the socio-economic impacts of NGN – Increasing the share of population that uses the internet and electronic services	✓	– Introducing tax relieves for purchasing and using ICT services – Conducting communication campaigns – Elaborating the national strategy for promotion of lifelong learning and use of ICT together with dedicated financial supports	x		x		
Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)		✓	– Addressing the socio-economic impacts of NGA – Ensuring the opportunity of fiber connectivity and broadband access with speeds exceeding 100 Mbps to all business organizations in the country – Increasing the coverage and improving the quality of electronic services in the field of education, healthcare, administration, etc.	✓	– Development of optical and wireless access (>100 Mbps) to businesses in white, grey and black areas – Elaboration of the relevant action plans and promotional measures (e.g. tax relieves for businesses) – Improving the regulatory frameworks and financial promotional supports	x		x		

### Croatia – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures		Vx
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	V	The strategy refers to a new national broadband plan 2016–2020 (under preparation) as the main reference plan for broadband development in Croatia						
	Horizontal and vertical coordination measures as well as involvement of stakeholders								
	Monitoring and updating mechanism (i.e. interim assessments)	x							
	Regulation (i.e. access obligations, regulated prices and reference offers)	x							

## Croatia – All measures defined by NBP

		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
Topics	Measures	How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures
Funding and financing	Measures/Plan for public investments	V	In the plan of expenses, the strategy relies on both national funds and co-financing of the European Union under the Multiannual Financial Framework for 2014–2020, and has been developed in a cooperation of several ministries as well as other state and public institutions and business, academic and wider community.						
	Available budgetary resources (their share & adequacy)	X							
	Description of potential/preferred business models	X							
	Measures to stimulate private investment	X							
	Investment priorities (i.e. in rural & remote areas)	X							
	Promotional measures	X							
	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	X							
Technology	Fixed broadband technology focus/priority	X							

SUPPLY SIDE MEASURES

## Croatia – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures		
TRANSPARENCY MEASURES	Coverage and service mapping tool	X							
	Infrastructure mapping showing the existing private and public networks and planned investments	X							
	Use of existing infrastructure	X							
	Coordination of civil works	X							
	Permit granting and electronic counters	X							
	Building readiness	X							
DEMAND SIDE MEASURES	Public services connectivity (i.e. schools, libraries etc.)	X							
	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	V	The main goal of the strategy is to strengthen the role of ICT in everyday life of the people and ensure that public administration functions within the frameworks of the future. Some relevant addressed measures are: – Improved business productivity of public administration through the use of ICT and new skills within public administration and towards users – Enhanced quality of life through the use of public administration e-services – Improved relationship between citizens and state administration through ICT use – Insurance of secure environment for the provision of public administration e-services – Increased competitiveness of economy through the use of public administration e-services – Opening up space for ICT-based innovations in public administration through the cooperation of public administration, scientific and business entities – Enhancement of user-oriented electronic public administration	V	The strategy provides the list of key activities for each of the measures in the following categories – Technical part – Organizational part – Legal part	V	The strategy provides a list of measurable indicators and the expected targets by 2020	V	The monitoring mechanisms as well as responsible authorities are explained for the action areas
	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	V		V					

## Cyprus – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
Topics		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures
REGULATORY & ORGANISATIONAL MEASURES Organization & management	Horizontal and vertical coordination measures as well as involvement of stakeholders	V	– Definition of the role and responsibilities of the main national actors	V	– Introducing the broadband development coordinator body	X		V	The Ministry of transport, communications and works (department of electronic communications) as the main coordinating and monitoring authority
	Monitoring and updating mechanism (i.e. interim assessments)	V	– Different types of monitoring tools (i.e. reports and mapping system) addressed in the NBP	V	– The annual progress report of the Digital Agenda Strategy – The annual action plan progress report – NGA coverage monitoring and comparison with the DAE targets – Investment impact assessment by 2017 – Continual assessment of the scoreboard indicators	V	Indicators & timelines addressed in the NBP	V	
	Regulation (i.e. access obligations, regulated prices and reference offers)	V	General provisions and statements: – Addressing different types of existing and proposed symmetric and asymmetric regulatory measures as the binding frameworks for broadband development	V	The regulatory measures such as wholesale access and prices monitoring are addressed in the NBP	X		X	



## Cyprus – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
Topics		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures
Funding and financing	Measures/Plan for public investments	V	The necessity of public and private investment addressed in the NBP	V	– Secured EU ESIF funds for broadband development – Government plan to secure financial support in the form of guarantees, project bonds, loans or grants	X		X	
	Available budgetary resources (their share & adequacy)	V	The amount of the secured ESIF fund is addressed (EUR 22 million)	X		X		X	
	Description of potential/preferred business models	X		X		X		X	
	Measures to stimulate private investment	V	Regulatory and policy measures to stimulate private investment are considered as a solution	V	Measures such as: – general wholesale access regulations – new spectrum assignments, etc. – international capacity prices monitoring	X		X	
	Investment priorities (i.e. in rural & remote areas)	V	Securing funds for remote areas as a priority in the NBP	V	EU ESIF under the EARDF for the development of wireless spots in rural areas	V	– The amount of funds is specified – No timeline is set	X	
	Promotional measures	V	Voucher scheme	V	Public financial support (vouchers) for the upgrade of in-building cabling at customer premises (households and SMEs) where the existing one is unsuitable to support high and ultrahigh speed connection	X		X	
Technology	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	V	Measures addressed concerning wireless networks and their future improvement as a complementary solution to fixed networks	V	Efficient use of spectrum and future plans for spectrum release (i.e. use of 800 Mhz band)	X		V	Office of Electronic Communications and Postal Regulation (OCECPR) as the responsible authority
	Fixed broadband technology focus/priority	V	FTTH as a preferred technology	X		X		X	

## Cyprus – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP		Responsibilities and monitoring mechanism addressed			
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed			
Topics		Vx		Vx		Vx			
TRANSPARENCY MEASURES	Coverage and service mapping tool Infrastructure mapping showing the existing private and public networks and planned investments	V	An inventory of electronic communications facilities and suitable passive infrastructure, with the aid of a GIS system is planned to be developed	V	Content of the mapping tool, interconnection with the single information point as well as the system (GIS based) are identified	V	A time schedule for creating the tool is set by the first semester of 2016	V	Office of Electronic Communications and Postal Regulation (OCECPR) as the responsible authority
		V		V		V		V	
	Use of existing infrastructure	V	General provisions / measures without any detailed operational measures	x		x		x	
	Coordination of civil works	V		x		x		x	
	Permit granting and electronic counters	V		x		x		x	
	Building readiness	V		x		x		x	
	Public services connectivity (i.e. schools, libraries etc.)	x		x		x		x	
DEMAND SIDE MEASURES	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	V	The NBP sets relevant targets for the digital development of citizens, businesses and organizations	V	Free wireless access in some remote rural areas aiming at digital inclusion of the local citizens by securing funds for development of wireless spots in these areas Installation of WLAN in public premises Several demand stimulation strategies (i.e. organization of awareness campaigns and training programmes)	x		x	
		V		V	Strategies for e-education and e-health Developing electronic services Digitalization of the government Programmes to finance SMEs to proceed with digitalization	x		x	

### Czech Republic – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
		✓x		✓x	if Yes, concrete measures	✓x	if Yes, concrete measures	✓x	if Yes, concrete measures	
REGULATORY & ORGANISATIONAL MEASURES	Organization & Management	Horizontal and vertical coordination measures as well as involvement of stakeholders	✓	The NBP emphasizes on an active approach with a focus on coordination regarding the implementation of the objectives of the Digital Agenda for Europe at the national level	✓	Setting up a coordination authority and mechanisms for harmonized implementation and monitoring of the strategy	x		✓	The Government Council for Competitiveness and the Information Society, together with the Ministry of Industry and Trade, will assume the role of the coordinating authority for the Digital Agenda. An integral aspect of this coordination is the consultation mechanism with all relevant bodies and the expert public that may be potentially affected by certain measures
		Monitoring and updating mechanism (i.e. interim assessments)	✓	The NBP sets mechanisms for monitoring, coordination and assessment of the implementation of the Digital Czech Republic v. 2.0	✓	Every year – on the basis of a report drawn up by the Ministry of Industry and Trade – the government will assess all measures adopted with the aim of updating them where necessary	✓	The NBP sets 17 measures for implementation	✓	
	Regulation (i.e. access obligations, regulated prices and reference offers)	x	Several EU and national regulatory frameworks are addressed in the NBP. It also sets mechanisms / measures for amending the current legislation	✓	Preparing methodological guidelines to unify the practical application of certain provisions of the Electronic Communications Act and the Building Act	x		✓	Ministry of Industry and Trade as the main coordinator	✓



## Czech Republic – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		Vx	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
				Vx	if Yes, concrete measures	Vx	if Yes, concrete measures		
TRANSPARENCY MEASURES	Mapping system	x		x		x		x	
		v	Preparing a proposal for the creation of a registry of passive infrastructure is proposed by the NBP	x		x		v	Ministry of Industry and Trade as the main coordinator
	Cost reduction	v	Stimulating the use of existing infrastructure covered in the NBP, without implication to cost reduction measures	v	Establishing the registry of passive infrastructure	x		v	Ministry of Industry and Trade as the main coordinator for the passive infrastructure database
		x		x		x		x	
		v	Besides using public funds for the construction of NGA networks, the state should also reduce the administrative and financial burden associated with obtaining building permits, planning approvals and rights of way.	v	Setting up a central information portal and making it operational	x		v	Ministry of Industry and Trade as the main coordinator
DEMAND SIDE MEASURES	Building readiness	x		x		x		x	
		x		x		x		x	
	Demand stimulation	v	Increasing the availability of ICT for all, regardless of locality, social status or disability	v	<ul style="list-style-type: none"> <li>– Reasonably priced access to superfast broadband</li> <li>– Supporting lifelong education with the aim of boosting digital literacy</li> <li>– Ensuring freedom of access to the Internet</li> <li>– Ensuring adequate public and private investment in human resources and electronic skills</li> </ul>	x		v	The main e-skills coordinator is the Ministry of Labour and Social Affairs
		v	The benefits of superfast internet for businesses and public services is widely addressed in the NBP. The final target is strengthening the digital economy.	v	<ul style="list-style-type: none"> <li>– Adopting a suitable regulatory approach with an emphasis on self-regulatory mechanisms owing to their specific nature to stimulate the digital economy</li> <li>– Guaranteeing that citizens may freely receive public-service programs via terrestrial broadcasting</li> <li>– Supporting the transition to IPv6 and assist in its successful implementation at the public-administration level.</li> <li>– Minimising the burden for internet businesses</li> <li>– The development of a legal and cross-border range of online products and services</li> <li>– The dissemination of tried-and-tested solutions for training employees using e-learning, with particular emphasis on small and medium-sized enterprises</li> </ul>	x		v	The Ministry of Industry and Trade will monitor and assess the impact of the use of new forms of ICT technology and will support self-regulatory mechanisms

## Denmark – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP				
		√x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed
				√x	if Yes, concrete measures	√x	if Yes, concrete measures	
REGULATORY & ORGANISATIONAL MEASURES Organization & management	Horizontal and vertical coordination measures as well as involvement of stakeholders	√	– Brief description of the role and responsibility of the main actors (i.e. government and regional authorities both in supply and demand stimulation)	x		x		x
	Monitoring and updating mechanism (i.e. interim assessments)	x		x				x
	Regulation (i.e. access obligations, regulated prices and reference offers)	√	Different types of regulatory frameworks (with the focus on competition enhancement) are referenced in the strategy	√	e.g. obligations for the incumbent for price squeezing and virtual access obligations	x		x

## Denmark – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
	Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
			√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures			
Supply Side Measures	Funding and financing	Measures/Plan for public investments	x			x	x		
		Available budgetary resources (their share & adequacy)	x			x	x		
		Description of potential/preferred business models	x			x	x		
		Measures to stimulate private investment	√	– As the broadband development is left to market, the importance of creating frameworks and providing suitable conditions for private investments is of high importance – Transparency and competition as the main drivers of broadband development	√	– Launching action plans for private sector contribution – Providing guides for municipalities and government institutions concerning the lease conditions and legal framework for mobile phone masts with the intent of promoting a more uniform and transparent practice – Imposing obligations on the incumbent in order to increase competition (i.e. commitment on price-squeezes, virtual access obligations etc.)	x	√	The Ministry of Business and Growth as the main responsible authority
		Investment priorities (i.e. in rural & remote areas)	x		x		x	x	
		Promotional measures	x		x		x	x	
		Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	√	Mobile broadband as a bridging technology for many rural areas	√	– Launching initiatives in the form of action plan “Better Mobile Broadband and Mobile Coverage throughout Denmark” – Spectrum auction programmes	√	√	Spectrum release measures together with respective timelines are addressed
Fixed broadband technology focus/priority	x		x		x	x			

## Denmark – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		V/x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
				V/x	if Yes, concrete measures	V/x	if Yes, concrete measures			
TRANSPARENCY MEASURES	Coverage and service mapping tool	V	Initiatives concerning the transparency of the coverage (including information on the quality of mobile antennas)	x		x		V	The Danish Business Authority as the main responsible authority	
		x		x		x		x		
	Cost reduction	Use of existing infrastructure	x		x		x		x	
		Coordination of civil works	x		x		x		x	
		Permit granting and electronic counters	x		x		x		x	
		Building readiness	x		x		x		x	
DEMAND SIDE MEASURES	Public services connectivity (i.e. schools, libraries etc.)	x		x		x		x		
	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	V	General provisions for enhancing the ICT skills	V	<ul style="list-style-type: none"> <li>– Establishing the "Growth Team" for ICT and Digital Growth to support ICT strongholds in Denmark and to strengthen the competitive power of Danish companies through the increased use of digitisation</li> <li>– Launching the market development fund to promote growth, job creation and exports particularly for SMEs</li> <li>– LaunchPad initiative presented by the Ministry of Business and Growth for attracting promising foreign entrepreneurs to Denmark (including ICT entrepreneurs)</li> <li>– Dedicating considerable amount of funding to skill development programmes</li> </ul>	x		x		
DEMAND SIDE MEASURES	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	V	<ul style="list-style-type: none"> <li>– The use of ICT and superfast internet for businesses to stimulate the economy</li> <li>– ICT in industry as a dynamic and innovative sector to stimulate economic growth</li> <li>– Digitalization of public services</li> <li>– Plans and initiatives to boost public demand for new welfare services</li> </ul>	V		x		x		



### Estonia – All measures defined by NBP

Topics		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		Measures	√x   How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
		√x	√x	√x	if Yes, concrete measures	√x	if Yes, concrete measures	√x   if Yes, concrete measures	
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	√	√	√	<ul style="list-style-type: none"> <li>– Formation of the Digital Agenda 2020 working group during the preparation of the strategy</li> <li>– Establishment of the thematic task-based working groups and networks for continuous coordination and implementation of the strategy</li> <li>– Bilateral or multilateral meetings of ministries for harmonization of the interministerial policy measures</li> </ul>	x		√	– The main steering body for the implementation of the strategy is the Information Society Council, led by the Prime Minister
	Horizontal and vertical coordination measures as well as involvement of stakeholders	√	√	√	<ul style="list-style-type: none"> <li>– Participation and coordination of different governmental and non-governmental actors are of high importance which are addressed in the Digital Agenda Estonia vision statement</li> <li>– A mid term evaluation of the strategy is planned to be carried out in 2017</li> </ul>				
	Monitoring and updating mechanism (i.e. interim assessments)	√		√		x		√	
	Regulation (i.e. access obligations, regulated prices and reference offers)	x		x				x	

## Estonia – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		Vx	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
				Vx	if Yes, concrete measures	Vx	if Yes, concrete measures		Vx
Funding and financing	Measures/Plan for public investments	V	State budget and EU funds are two main financial sources for the implementation of the action plans	X		X		X	
	Available budgetary resources (their share & adequacy)	V		X		X		X	
	Description of potential/preferred business models	X		X		X		X	
	Measures to stimulate private investment	V	The strategy forsee active contribution of private investment especially for access network development and therefore, proposes measures for stimulation of private investment	V	– Reducing the administrative burden – Promoting the Community initiative – Supporting the development of the last mile	X		X	
	Investment priorities (i.e. in rural & remote areas)	V	Particular attention will be paid to the integration of social groups with special needs, to regional development and to the strengthening of local initiative.	X		X		X	
	Promotional measures	X		X		X		X	
Technology	Convergence of networks i.e. mobile and satellite as complementary/bridging technologies)	V	Mobile broadband as an important complementary technology	V	– Availability of spectrum as a solution to provide mobile internet connection in areas where fixed networks are not available/not become available in short term period – The secure unkeep of public WLAN networks (mainly provided by the public sector organizations (i.e. local authorities) by publishing respective principles and establishing a monitoring system)	V	Measurable targets and timeline are addressed	X	
	Fixed broadband technology focus/priority	X		X		X		X	

## SUPPLY SIDE MEASURES

## Estonia – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP							
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures		
TRANSPARENCY MEASURES	Coverage and service mapping tool	X		X		X		X			
		X		X		X		X			
	Infrastructure mapping showing the existing private and public networks and planned investments	X		X		X		X			
		X		X		X		X			
	Use of existing infrastructure	X		X		X		X			
		X		X		X		X			
Cost reduction	Coordination of civil works	X		X		X		X			
	Permit granting and electronic counters	X		X		X		X			
	Building readiness	X		X		X		X			
DEMAND SIDE MEASURES	Public services connectivity (i.e. schools, libraries etc.)	V	Generally addressed	X		X		X			
	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	V	– The economic competitiveness, well-being of people as well as efficiency of public services are addressed as the main targets of the strategy	V	– Establishment of the nordic digital infrastructure institute as an international center for joint development of e-services	V	– Carrying out a reform of public e-services and the supporting ICT solutions	V	– Measurable targets and timelines are addressed in the strategy, concerning: – ICT skills relevant indicators – Public services and e-administrative – etc.	V	– The implementation of the strategy in different areas will be done by the support of action plans identifying activities and action areas for at least the next two years. Action plans define concrete activities with their respective responsible authorities. Annual reports are the main baselines for evaluation & monitoring of the progress.
		V	– Establishment of the wide range of e-services (both country wide and cross-border)	V	– Promotional measures for the reputation of Estonia as a hub for innovation and development of information society	V	– Programmes to enhance public sector capacity to apply data analytics solutions	V	– The main steering body for the implementation of the strategy is the Information Society Council, led by the Prime Minister		
	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	V	– Establishment of the state information system	V	– Establishment of the global information society think tank	V	– Programmes for lifelong learning	V	– Internet freedom and net-neutrality provision		

### Finland – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP			
		√x	How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed	
		√x	if Yes, concrete measures	√x	if Yes, concrete measures	√x	if Yes, concrete measures
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	x	–				
	Horizontal and vertical coordination measures as well as involvement of stakeholders						
	Monitoring and updating mechanism (i.e. interim assessments)	x	–				
	Regulation (i.e. access obligations, regulated prices and reference offers)	x	–				

## Finland – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP											
		√x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed							
				√x	if Yes, concrete measures	√x	if Yes, concrete measures	√x	if Yes, concrete measures	√x	if Yes, concrete measures				
SUPPLY SIDE MEASURES	Funding and financing		x	–											
			x	–											
			x	–											
			x	–											
			x	–											
			x	–											
			x	–											
Technology		x	–												
		x	–												

## Finland – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP			
		vx	How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed	
		vx	if Yes, concrete measures	vx	if Yes, concrete measures	vx	if Yes, concrete measures
TRANSPARENCY MEASURES	Coverage and service mapping tool	x	-				
	Infrastructure mapping showing the existing private and public networks and planned investments	x	-				
	Use of existing infrastructure	x	-				
	Coordination of civil works	x	-				
	Permit granting and electronic counters	x	-				
	Building readiness	x	-				
	Public services connectivity (i.e. schools, libraries etc.)	x	According to the previous NBP and the Digital Agenda 2020 of Finland, measures are needed to ensure connections to schools, libraries and one-stop public service points				
DEMAND SIDE MEASURES	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	x	Digital literacy, ICT skills, e-economy and new generation of government and public services are considered as important targets for the Digital Agenda Finland	<ul style="list-style-type: none"> <li>- Incorporating ICT use as an integral part of learning at school as well as basic and supplementary teacher training.</li> <li>- Incorporating the civic and media skills needed into the information society as an integral part of the Finnish education system.</li> <li>- Scaling up investment in applied ICT know-how</li> <li>- Providing assistance and practical advice on ICT use to people throughout the country</li> </ul>			
	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	x		<ul style="list-style-type: none"> <li>- Giving all individuals equal opportunities to use e-services. This shall be ensured by providing training and free access to terminals at public service points.</li> <li>- Encouraging and obligating decision-makers and officials to create opportunities for process and social innovations through taking active part in dialogue with citizens</li> <li>- Incentivising people to participate in decision-making in society and support the development of social online services or environments</li> <li>- Allocating resources to universities and the Academy of Finland for basic and applied research into the service and knowledge economy, ICT and other lines of work promoting the development of the digital society</li> </ul>			

## France – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
		✓x		✓x	if Yes, concrete measures	✓x	if Yes, concrete measures		✓x	if Yes, concrete measures
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	Horizontal and vertical coordination measures as well as involvement of stakeholders	✓	Local and regional authorities participation is of high importance to the success of the plan	✓	<ul style="list-style-type: none"> <li>– Introducing different types of cooperation agreements and mechanisms</li> <li>– Different mechanisms are proposed in the NBP concerning the coordination of both public and private partners (i.e. presentation of the network development plans to future network operators aiming at ensuring the commercialization of the projects)</li> <li>– Publishing and updating of projects plans of all regions and localities on the NRA website</li> <li>– In order to run the "France THD" plan, Regions have been invited by the French State to develop Digital Territory Planning Strategies called "SCORAN" ("Stratégie de Cohérence Régionale pour l'Aménagement Numérique") and départements have been invited to conceive Telecom Territory Planning Blueprints called "SDTAN" ("Schéma Directeur Territoriaux pour l'Aménagement Numérique").</li> </ul>	x		✓	The roles and responsibility of contributing actors are addressed in the NBP
		Monitoring and updating mechanism (i.e. interim assessments)	✓	Measures on eligibility control and constant monitoring of the progress addressed in the NBP	✓	<ul style="list-style-type: none"> <li>– Mechanisms for controlling the project request and plans for realization</li> <li>– Mechanism for architecture and technical specifications and commercialization plans</li> <li>– Establishment of the deployment national observatory</li> </ul>	✓	Timelines for realizing some of the measures addressed	✓	A central task force called "Mission Très Haut Débit" is in charge of monitoring the plan with the local authorities, supported by a central tool for the mapping of fixed tele-com infrastructure
	Regulation (i.e. access obligations, regulated prices and reference offers)	✓	The NBP provides several references to the existing regulatory measures	✓	<ul style="list-style-type: none"> <li>– List of all the relevant regulatory measures binding in the process of broadband development</li> <li>– Harmonized access charges by providing the service catalogue</li> </ul>	x		x		

## France – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed				
Topics		✓x	if Yes, concrete measures	✓x	if Yes, concrete measures	✓x	if Yes, concrete measures		
Supply Side Measures	Funding and financing	Measures/Plan for public investments	✓	The French State has set up a 10-year financing plan (2013–2022) with a 3.3 billion Euros subsidy budget that will finance public infrastructure networks through a central Fund called "Fond National pour la Société Numérique" (FSN).	✓	Following measures are covered: – Terms and condition on the eligibility of the projects as well as details of costs being covered through the funding measures – Setting up a monitoring system – Providing a toolbox for local authorities as a guidance to access to different types of funding and financial instruments	✓	A central task force called "Mission Très Haut Débit" is in charge of monitoring the plan with the local authorities, supported by a central tool for the mapping of fixed tele-com infrastructure.	
		Available budgetary resources (their share & adequacy)	✓	The funding and financial instruments, sources and their amount are addressed in the NBP (i.e. state and EU aids support from the European investment Bank (EIB) or from the European Investment Fund (EIF)).	✓	French local authorities/syndicates usually choose between three kinds of legal structures: – The municipal model, directly paid and run by the Local Authority (at 100% through a "régie" model or shared with a private operator in a Public Private Partnership model) – The publicly-owned privately-run model where a private operator is paid to run the network ("after-mage" model) – The conceding model where the whole project is fully outsourced to one single private operator ("concession" model)	✓		
		Description of potential/preferred business models	✓	Different types of business models (especially with the focus on local authorities participation) are addressed in the NBP	✓	Measures on the compulsory presence of private initiatives in project applications for the use of funds – Limitation for funding allocation in areas where private sector plans for deployment in the next 3 years exist	✓		
		Measures to stimulate private investment	✓	The objective of "France THD" was to strengthen and consolidate the roll-out plans of private operators by ensuring that there will not be any public investment that would eventually jeopardize their profitability. At the same time, where private operators decide not to invest, the NGA Plan gives local authorities ("Départements") the ability to set up a local public digital infrastructure networks ("Réseau d'Initiative Publique" or "RIP") in a non-competitive environment.	✓	Measures concerning the rurality indicators	✓		
		Investment priorities (i.e. in rural & remote areas)	✓	Less developed areas and areas with lack of market interest are of high priority	✓	The plan provides a budget bonus for projects covering more than one département (+10% for two départements and +15% for three and more)	✓		
Technology	Technology	Promotional measures	✓	Alternative technologies (like Satellite, Wimax or WLAN) can also be supported if fibre technology cannot be rolled out in the long run or at unreasonable cost.	✓	State financial support	✓		
		Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	✓	The plan, although technologically neutral, relies heavily on fibre technologies and aims to cover the whole country by 2022 mostly with FTTH/B at more than 30 Mb/s	✓		✓		
		Fixed broadband technology focus/priority	✓						



## France – All measures defined by NBP

Topics		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		Measures		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
		✓x	How are the measures addressed ?	✓x	if Yes, concrete measures	✓x	if Yes, concrete measures	✓x	if Yes, concrete measures	
TRANSPARENCY MEASURES		Mapping system	✓	Service level mapping addressed in the NBP	✓x		x		x	
			✓	Infrastructure mapping showing the existing private and public networks and planned investments	x		x		x	
			✓	Use of existing infrastructure	✓	The cost reduction measures are addressed in the NBP	x		x	
			✓	Coordination of civil works	✓	Access terms and conditions are addressed in the NBP A central tool for the mapping of fixed telecom infrastructure	x		x	
			✓	Permit granting and electronic counters	✓	Publishing the list of existing public initiatives networks in each territory	x		x	
			✓	Building readiness	✓	General regulatory measures on building readiness are addressed	x		x	
DEMAND SIDE MEASURES		Public services connectivity (i.e. schools, libraries etc.)	✓	The NBP has a dedicated part for service and connection priority buildings, where connection of public buildings (i.e. schools and local educational institutions, institutions health, accommodation facilities for dependent elderly people and businesses) are prioritized	✓	Setting extra ceiling for the financial support to access these types of public services	x		x	
		Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	x						x	
		Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	✓	– Addressing the high capacity communications networks as a fundament of the economic growth in French regions – General measures concerning public policy and stimulation of e-services (i.e. e-education & e-health)	✓	The NBP sets measures on the following relevant topics: – Rapidly reduce the digital divide by providing pragmatic solutions to areas currently unsuitable for high quality broadband connections – Ensure regional competitiveness by bringing fiber optics to sites of economic activity – Contribute to the planning and effectiveness of public services by via fiber connection of general interest websites	x		x	

### Greece – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP			
		How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed		
Topics		Vx	Vx	Vx	Vx	Vx	Vx
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	V	V	V	V	V	V
	Horizontal and vertical coordination measures as well as involvement of stakeholders	V	V	V	V	V	V
	Monitoring and updating mechanism (i.e. interim assessments)	V	V	V	V	V	V
	Regulation (i.e. access obligations, regulated prices and reference offers)	V	V	V	V	V	V

A. Topics/measures covered by NBP

B. Operationalization Level of proposed measures by NBP

How are the measures addressed ?

Implementation of measures addressed

Indicators and time schedule addressed

Responsibilities and monitoring mechanism addressed

V Coordination and participation of actors addressed as an important target (i.e. a wide public consultation has been carried out for the preparation of the NBP)

V The NBP covers the following:  
– Setting up a permanent coordination and monitoring group  
– setting interim measurable targets

V The NBP provides a concrete time schedule of the main actions as well as the responsible authorities

V General Secretariat for Telecommunications and Post as the main responsible authority to establish a constant horizontal NGA group with participation of all stakeholders

V The necessity of a monitoring system accompanied by a combination of political, regulatory and financial interventions

V

V

V

V – Different EU and national regulatory frameworks are addressed and referenced in the NBP  
– Regulatory measures are foreseen as a tool for stimulating coordination and creating an appropriate investment environment (i.e. access requirements, utilization of existing infrastructure etc.)

V

V

V

V

V

V

V

## Greece – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		√x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
				√x	if Yes, concrete measures	√x	if Yes, concrete measures		√x
SUPPLY SIDE MEASURES	Funding and financing	√	Public intervention focuses on securing private investments and sustainable economic growth and investment in areas with market failure	x	Concrete plans for public funding and financial measures are addressed	√	The amount and timeline are addressed in the NBP	x	
		√	The maximum estimated financial/funding sources and their share are addressed in the NBP	x		x		x	
		x		x		x		x	
		√	The private sector is expected to cover the majority of investments (addressed as the first pillar in the NBP)	√	Public intervention to support the sustainability of the private investment, enhancing the competition and reducing the risk arising from low demand – Launching appropriate legal framework – Establishing the Digital Registry of Network Infrastructure – Resolving problems in licensing of installation antennas (through revised regulatory measures and creating a one stop shop facility licensing system) – Simplification of the administration (the burdensome administrative procedures)	x		x	
		√	There are two investment priorities set by the NBP: – securing private investments and to make them sustainable – areas with market failure	x		x		x	
		x		x		x		x	
Technology	√	Mobile and wireless technologies as a bridging technology	√	– Consideration of the European Radio Spectrum Policy Programme – Spectrum auction release programmes – Resolving problems in licensing of installation antennas (through revised regulatory measures and creating a one stop shop facility licensing system)	x		x		
	√	Technology neutrality principle	x		x		x		

## Greece – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
		V/x		V/x	if Yes, concrete measures	V/x	if Yes, concrete measures	V/x	if Yes, concrete measures
TRANSPARENCY MEASURES	Mapping system	<p>V Coverage and service mapping tool</p> <p>V Infrastructure mapping showing the existing private and public networks and planned investments</p> <p>V Use of existing infrastructure</p> <p>V Coordination of civil works</p> <p>V Permit granting and electronic counters</p> <p>V Building readiness</p>	<p>V Mapping existing and estimated future, broadband coverage as a measure in the NBP</p> <p>V Establishment of the Digital Registry of Network Infrastructure is addressed in the NBP aiming at reducing the cost and facilitating the broadband deployment</p> <p>V Cost reduction directive of the EU addressed in the NBP as a fundamental element in achieving the targets of DAE</p>	<p>X</p> <p>X</p> <p>V</p> <p>V</p> <p>V</p> <p>V</p> <p>V</p>	<p>X</p> <p>X</p> <p>V</p> <p>V</p> <p>V</p> <p>V</p> <p>V</p>	<p>X</p> <p>The content of the system as well as timelines are set</p> <p>Timeline for some of the measures are addressed in the NBP</p>	<p>X</p> <p>X</p> <p>V</p> <p>V</p> <p>V</p> <p>V</p>	<p>Responsible authorities as well as respective regulatory measures are addressed in the NBP</p>	
		<p>V Public services connectivity (i.e. schools, libraries etc.)</p>	<p>V Connection of public services are of high priority in the NBP</p>	<p>V</p>	<p>V</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p></p>
		<p>V Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)</p>	<p>V Stimulating the demand basic broadband services, in order to reduce the digital gap and illiteracy within the Greek society and to stimulate the broadband market and investors' interest for investment in NGA</p>	<p>V</p>	<p>V</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p></p>
		<p>V Measures for stimulating the benefit of superfast internet (i.e. in business &amp; research, e-administration, e-services etc.)</p>	<p>V The need for broadband and its impact on economic growth as well as its contribution to emerging Social Welfare (i.e. E-Services) are topics covered by the NBP</p>	<p>V</p>	<p>V</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p></p>
DEMAND SIDE MEASURES	Demand stimulation								

### Germany – All measures defined by NBP

S REGULATORY & ORGANI- SATIONAL MEASURES	Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		Measures	√x How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
				√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures		
	Organization & management	Horizontal and vertical coordination measures as well as involvement of stakeholders	√	Cooperation and participation of actors as a key for more efficient network development	√	Creation of the "Netzallianz Digitales Deutschland" as an expert discussion forum	x	x	x
		Monitoring and updating mechanism (i.e. interim assessments)	x		x		x		x
		Regulation (i.e. access obligations, regulated prices and reference offers)	√	Regulatory frameworks are considered as the main measures for enhancing the competition environment	x		x		x

## Germany – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
		V/x		V/x	if Yes, concrete measures	V/x	if Yes, concrete measures		
SUPPLY SIDE MEASURES	Funding and financing	Measures/Plan for public investments	V	The necessity of state support for development of superfast internet as a precondition (focusing on public funding / financial instruments for areas with lack of market interest)	V	Some types of funding schemes are addressed: such as the GAK funding for rural areas (white areas)	X	X	
		Available budgetary resources (their share & adequacy)	X		X		X		
		Description of potential/preferred business models	X		X		X		
		Measures to stimulate private investment	V	Creating a competition environment by appropriate regulation as a target in the strategy	V	"Netzallianz Digitales Deutschland" expert forum with a focus on discussing the frameworks for stimulation of market investments	X	X	
		Investment priorities (i.e. in rural & remote areas)	V	Digital access of rural areas as a priority in the strategy	V	– Regulatory and cost reduction measures – Financial support mechanisms	X	X	
		Promotional measures	X		X		X		
		Technology	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	V	Wireless and satellite technologies as a bridging solution for remote/rural areas	V	Rapid provision of frequency auctions	X	X
			Fixed broadband technology focus/priority	X		X		X	

## Germany – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		V/x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
				V/x	if Yes, concrete measures	V/x	if Yes, concrete measures		V/x	if Yes, concrete measures
TRANSPARENCY MEASURES	Coverage and service mapping tool	x		x		x		x		
		x		x		x		x		
	Mapping system	Infrastructure mapping showing the existing private and public networks and planned investments	x		x		x		x	
		Use of existing infrastructure	v	Enhancing the transparency of the networks for better use of existing infrastructure	x		x		x	
		Coordination of civil works	v	General measures for coordination and cooperation of the actors for more transparent infrastructure development procedure	x					
		Permit granting and electronic counters	x		x		x		x	
Demand stimulation	Building readiness	x		x		x		x		
	Public services connectivity (i.e. schools, libraries etc.)	v	Strategic measures are addressed together with some of the current and future planned programmes	v	e.g. the funding programme for Digital Media for the vocational training	x		x		
	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	v	A priority line of the strategy is dedicated to the digital life and society in the strategy	v	<ul style="list-style-type: none"> <li>– Establishing technology driven research programmes</li> <li>– New business models and financial supports</li> <li>– Providing norms and standards</li> </ul>	x		x		
DEMAND SIDE MEASURES	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	v	Priorities are set concerning: <ul style="list-style-type: none"> <li>– digital economy and work (i.e. Industry 4.0)</li> <li>– digital administration and e-services (i.e. smart cities)</li> <li>– digital education and research</li> <li>– etc.</li> </ul>	v	<ul style="list-style-type: none"> <li>– Establishment of the ICT competence centers</li> <li>– Regular dialogue with society (communication and capacity building programmes, digital participation etc.)</li> </ul>	x		x		

### Hungary – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
Topics		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures
REGULATORY & ORGANISATIONAL MEASURES	Horizontal and vertical coordination measures as well as involvement of stakeholders	V	Stimulating the participation of the actors forseen as one of the main targets in the strategy (i.e. a wide public consultation has been carried out in the process of strategy preparation)	V	The strategy proposes a table addressing the responsible actors in relation to different pillars and their partnership scheme	x		V	
		V	<ul style="list-style-type: none"> <li>– The NBP has set interim measurable objectives on the coverage and take up of both fixed and mobile broadband networks</li> <li>– A monitoring system is proposed to monitor the results and impacts of the strategic interventions with a review system established in the status analysis</li> </ul>	V	<ul style="list-style-type: none"> <li>– Implementation of the broadband programmes can be continuously followed up by the government with the help of a Infrastructure Registry and Monitoring System</li> <li>– The result of the regular monitoring is forseen to be published on the government website</li> </ul>	V	<ul style="list-style-type: none"> <li>– Annual monitoring is forseen by the strategy</li> <li>– Indicators are addressed</li> </ul>	V	<ul style="list-style-type: none"> <li>– The main responsibility for the implementation of the strategy lies with the Infocommunications State Secretariat of the Ministry of National Development (MND)</li> <li>– The National Media and Infocommunications Authority (NMIA) is responsible for the implementation of the regulatory measures</li> </ul>
	V	Regulatory measures are considered as an important dimension in future network development (especially in safeguarding market investment)	V	Further development of the market regulatory system to encourage investments and competition (i.e. liberalisation of wholesale price regulation, consideration of regional differences and employment of obligations compliant with the new EU recommendations)	x		x		



## Hungary – All measures defined by NBP

Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP							
	Vx	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
			Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures		
SUPPLY SIDE MEASURES	Funding and financing	Measures/Plan for public investments	V	– State support in financing and implementation of the network is foreseen accompanied with quantified investment needs	V	Employment of development policy instruments (credit lines, credit guarantees, reimbursable subsidies, non-reimbursable subsidies, other EU funds, etc.) to support network development and network migration.	X	X	X	
		Available budgetary resources (their share & adequacy)	X		X		X		X	
		Description of potential/preferred business models	V	4 types of business models addressed considering the domestic network development experiences and results coming from EU finance development, namely: – Community broadband model – Publicly run municipal network – Operator subsidy – Privately run municipal network	V	– The operator subsidy is G23proposed as the preferred model. If funding has been issued, G23the state imposes certain obligations for the beneficiary, which the network owner/ operator has to fulfil. (e.g., open access offering for other service providers via wholesale services, pricing based on reference prices, etc.) – In certain cases public outsourcing is also reasonable.	X	X	X	
		Measures to stimulate private investment	V	The main target of the strategy is to enhance & promote the investment by private sector	V	– Establishing the infrastructure mapping system – Launching market consultations especially for market players – Detailed needs assessment, sharing infrastructure, reducing the permit gathering process, etc.	X	X	X	
		Investment priorities (i.e. in rural & remote areas)	V	– Exclusive utilization of the public support in areas with market failure – Promoting the building of the missing sections of the backhaul network	V		X	X	X	
	Technology	Promotional measures	V	Establishment of “development credit schemes” to support developments that cannot be implemented on a market basis	X	e.g., tax relief for developments	X	X	X	
		Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	V	Mobile (4G, LTE) and wireless broadband as a complementary solution to fixed networks. The strategy has set mobile broadband coverage and take up targets in line with the fixed networks	V	– A national spectrum strategy should be established – Establishing a regulatory environment to strengthen competition in the mobile market (e.g. new business models, etc.).	X	X	X	
		Fixed broadband technology focus/priority	V	The strategy considers FFTx or Docsis 3.0 technology capable of achieving the DAE targets	X		X	X	X	

## Hungary – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP							
	Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
			√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures				
TRANSPARENCY MEASURES	Mapping system	Coverage and service mapping tool	x		x		x			
		Infrastructure mapping showing the existing private and public networks and planned investments	√	Infrastructure mapping system should be designed, allowing the utilization of synergies and reducing the costs of network building		√	A timeline is set by the strategy	x		
	Cost reduction	Use of existing infrastructure	√	Some general provision are addressed in the strategy to enhance infrastructure sharing and coordination activities as well as shortening the timeframe of permit gathering	√	– Establishing the infrastructure mapping system – Supporting access regulation frameworks	√	A timeline is set by the strategy	x	
		Coordination of civil works	√		√	Establishing the infrastructure mapping system	√	A timeline is set by the strategy	x	
		Permit granting and electronic counters	√				x		x	
DEMAND SIDE MEASURES	Demand stimulation	Building readiness	x				x		x	
		Public services connectivity (i.e. schools, libraries etc.)	√	The strategy emphasizes further developing network access of public and local government institutions (health, education, social, child welfare and child protection, cultural institutions, local governments).	x		x		√	The operation of the National Telecommunications Backbone Network (NTBN) which satisfies the broadband demand of primarily state, public administration and educational institutions is the responsibility of MVM–NET Ltd.
		Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	√	Development of the digital competences of the population (as well as disabled individuals), micro, small and medium-sized enterprises and public administration employees, reduction of the primary (digital illiteracy) and secondary (low degree of utilisation) digital divide are addressed	√	– Developing online campaigns – Development of the community internet service spaces – Training and motivation programmes – Establishment of competence centres & research cooperation – Seed capital financing and incubation support for ICT start-up companies	√	The strategy has set measurable targets and timelines for each of the action areas	x	
		Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	√	The strategy emphasizes that the information and communications networks, tools, services and competences contribute increasingly to the improvement of the quality of life of citizens; the competitiveness of businesses and the efficiency of the operation of the state.	√	– Establishing common standards – Preparation of e-services action plan	√		x	

## Ireland – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
				✓x if Yes, concrete measures	✓x if Yes, concrete measures	✓x if Yes, concrete measures	✓x if Yes, concrete measures			
Topics	Organization & Management	Horizontal and vertical coordination measures as well as involvement of stakeholders	✓	Participation of the actors as of high importance in the preparation and implementation of the plan (i.e. the updated strategy has developed intensive engagement with industry and wider stakeholders)	✓x		x		✓	The DCENR as the main responsible authority
		Monitoring and updating mechanism (i.e. interim assessments)	✓	An interactive mapping system addressed in NBP and established as a tool for monitoring the progress of implementation	✓x		x		✓	
		Regulation (i.e. access obligations, regulated prices and reference offers)	✓	The intervention strategy requires the build-out of a future proof wholesale, open access network capable of meeting defined minimum standards	✓	In order to reduce the possibility of monopoly & ensure equal access by all operators, following regulatory measures are proposed: – Accounting separation between the wholesale and retail arms of any winning bidder(s) – Marketing and branding for the company that builds out the network must be distinct and separate from its existing retail branding – Retailers will have equal access to the network, defined in regulatory terms as "equivalence of inputs" – A suite of contractual undertakings with the winning bidder(s) covering equality of pricing, equivalence of inputs, operational key performance indicators, performance incentives for wholesale only operations and service credit deductions for non-performance – The winning bidder(s) will be required to demonstrate that all retail operators can interact with the company, regardless of size – The winning bidder(s) will be required to publish a list of retailers who have been granted access to the service	✓		x	

## Ireland – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP				
		How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed			
Topics		✓x	✓x if Yes, concrete measures	✓x if Yes, concrete measures	✓x if Yes, concrete measures	✓x if Yes, concrete measures		
SUPPLY SIDE MEASURES	Funding and financing	Measures/Plan for public investments	✓ – According to the intervention strategy, the implementation of the NBP requires substantial public funding. The initially allocated amount of funding will be accompanied by further funding during the implementation of the plan	✓ Details concerning financial and state aid issues are addressed in comprehensive financial reports attached to the intervention strategy. Some of the measures are: – Establishment of the Next Generation Broadband Task Force in May 2012, comprising representatives of TLC industry, with the aim to accelerate investment – In order to facilitate a competitive market where retailers can provide services to all premises in the intervention area, the wholesale network to be built will have to include provisions to deliver backhaul and access to premises. – Alternative ownership models – Using mapping and modeling methods for estimation of the required investment – Introducing the process of procurement – Investment (fund allocation) in accordance with the socio-economic conditions of the territory	✓	✓	✓ Details addressed in annex thematic reports (generally DCENR and the NRA as the main responsible authorities in the process)	
		Available budgetary resources (their share & adequacy)	✓ – Various options have been explored in terms of the source of funding for the commercial sector and the state including commercial market lenders, the European Investment Bank (EIB), Ireland Strategic Investment Fund (ISIF) and the European Fund for Strategic – Investment (EFSI), all of which have expressed an interest in funding any commercial aspect of the investment	✓	✓	✓	✓	
		Description of potential/preferred business models	✓ Alternative business models concerning commercially challenging areas are addressed	✓	✓	✓	✓	✓
		Measures to stimulate private investment	✓ A key principle of the NBP is to support and stimulate commercial investment through policy and regulatory measures. This open access nature will allow any retail company to access the network on transparent and equal terms and conditions.	✓	✓	✓	✓	✓
		Investment priorities (i.e. in rural & remote areas)	✓ This intervention strategy focuses on the remaining 30% of the country – areas where there is no certainty of commercial investment, but where families and businesses are equally entitled to high quality broadband access.	✓	✓	✓	✓	✓
		Promotional measures	x	x	x	x	x	x
Technology	Technology	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	✓ Technology neutrality as a general condition	✓ Terms and conditions are addressed in the detailed thematic annex reports	✓	✓	✓ Terms and conditions are addressed in the detailed thematic annex reports	
		Fixed broadband technology focus/priority	✓	✓	✓	✓	✓	

## Ireland – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		Vx	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
				Vx	if Yes, concrete measures	Vx	if Yes, concrete measures		Vx
TRANSPARENCY MEASURES	Coverage and service mapping tool	V	The NBP emphasizes the importance of a mapping tool showing the coverage of the existing networks and services as well as future planned developments	V	This has involved public consultation, engagement with industry and an assessment of notified commercial investment plans.	X	X	X	
		X		X		X		X	
	Cost reduction	Use of existing infrastructure	V	Maximising re-use of existing infrastructure addressed as one of the main objectives of the strategy	V	The process is introduced in the NBP intervention strategy and further explained in the technical annex report.	V	V	V
		Coordination of civil works	V	Terms and conditions are addressed in the detailed thematic annex reports	V		V	V	V
		Permit granting and electronic counters	V		V		V	V	V
		Building readiness	V		V		V	V	V
DEMAND SIDE MEASURES	Public services connectivity (i.e. schools, libraries etc.)	V	The National Digital Strategy has demonstrated the possibilities that digital technologies offer citizens, communities, schools and small businesses	X		X	X	X	
	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	V	– The government recognises that effective broadband connectivity is vital to social inclusion and economic growth at local and national levels. – The NBP reflects Government objectives to deliver new opportunities for jobs, growth and social inclusion. – The efficient delivery of public services including education, healthcare and central and local government services is increasingly reliant on digital platforms.	V	– A key principal for connecting consumers is that prices are affordable. The services to be delivered must be of similar speed and quality to those available in urban areas and towns. Also, prices including connection costs for existing premises, must be aligned with national prices for such services. – Bidder(s) will be required to show how they intend to encourage early take-up and commit to such measures in their contract(s); and outline how they propose to engage with communities (both local and business) on the benefits of the network and its availability in their area	V	X	X	
	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	V		V		V	X	X	

## Italy – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
Topics		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	V	Horizontal and vertical coordination measures as well as involvement of stakeholders	V	<ul style="list-style-type: none"> <li>Public consultation for preparation of the strategy</li> <li>Benchmarking the experience of the pioneer countries</li> <li>Establishing the Committee for the spread of ultra-fast broadband named "COBUL", which coordinates the implementation of the strategy and is composed of representatives from the following entities: Government, MISE, AGID, Infratel and Agenzia per la Coesione</li> <li>Regions, autonomous provinces and municipalities define the operational programs with the technical support of Infratel Italy and coordination of AGID</li> </ul>	x		V	Roles and responsibilities are addressed in the NBP (National, regional and local)
		V	Monitoring and updating mechanism (i.e. interim assessments)	V	<ul style="list-style-type: none"> <li>The strategy foresees regular updating and monitoring of the strategy and its implementation</li> </ul>	V	The plan will be updated every six months starting from the second half of 2015	V	<ul style="list-style-type: none"> <li>COBUL as the main monitoring authority for the development of the National Broadband Strategy</li> <li>Infratel as the responsible body for the clusters database</li> <li>Infratel and AGCOM as the responsible authorities for tendering and state aid allocation (supervised by COBUL)</li> </ul>
		V	Regulation (i.e. access obligations, regulated prices and reference offers)	V	Regulatory measures are considered as one of the main tools to safeguard the implementation of the NBP (i.e. Net neutrality, open networks, equivalent and non-discriminatory access conditions)	V	<ul style="list-style-type: none"> <li>Preparation of new and change of the existing regulation (i.e. Digital Universal Service, the guarantee fund, voucher scheme, convergence of price for the new subsidised high speed networks and the price of basic broadband networks in the timeframe of the plan)</li> <li>Simplification of the regulatory framework</li> <li>Promotion of the national installation standards</li> </ul>	V	Regulatory updates in accordance with the 2020 timeframe

## Italy – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP							
		How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed						
Topics		Vx	Vx	Vx	Vx	Vx	Vx				
SUPPLY SIDE MEASURES	Funding and financing	Measures/Plan for public investments	V	Direct public intervention (funding and financing) addressed by the NBP	V	Developing the national framework for public interventions – Facilitating access to economic resources, establishment of a center for the attraction of funds/guaranteee funds and credits at subsidized rates – Beside ERDF and EARDF funds, the strategy involves the use of different financial instruments that leverage on the low cost of financing (i.e. bank loans, PPP by project financing, issuance of project bonds, guarantees, credit enhancements)	x		V	MISE, COBUL & AGCOM as the main responsible authorities to monitor the status in accordance to their areas of work	
		Available budgetary resources (their share & adequacy)	V	– Public funding sources and their capacity explained in the NBP	V	Description of the workflows/procedures as well as the regulatory measures concerning each of the intervention models addressed in the NBP, namely: – Direct intervention – Public Private Partnership – Incentive model – Intervention for demand aggregation	x		V		
		Description of potential/preferred business models	V	Different types of investment and business models are addressed in the NBP	x			x		V	
		Measures to stimulate private investment	V	Increasing business competitiveness and innovation is an important target in the strategy	V	Simplification of the regulatory framework (i.e. for better use of existing infrastructure as well as coordination activities)	x			V	
		Investment priorities (i.e. in rural & remote areas)	V	The NBP proposes four priority areas (a,b,c,d) in accordance to the population density, presence of optical network and rural areas: – for clusters a & b: NGA network with more than 100 Mbps – for clusters c & d: NGA network with at least 30 Mbps	x		x		V		
		Promotional measures	V	– Provision of vouchers for all end-users that migrate towards new infrastructure in accordance with the architecture of the underlying network – Tax incentives, credit at subsidized rates and grants (i.e. tax-exempt investments in ultra-wide broadband infrastructures)	x		x		V		
		Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	V	Mobile, wireless & satellite technologies as complementary technologies	V	– Radio base stations with fiber-based connection is the solution that creates the best conditions to fully exploit LTE networks capabilities, removing back-hauling limitations. – Spectrum review – Introducing regulations that improve spectrum use and foster a more efficient use of spectrum and the development of Gmobile broadband services	x		V	MISE as the main responsible authority to monitor the conditions	
		Fixed broadband technology focus/priority	V	Technology neutrality with the focus on optical network (FTTH) as a priority in the NBP	V	The NBP proposes several technological scenarios for the realization of the plan	x		V		

## Italy – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP				
	Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed
			√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	
TRANSPARENCY MEASURES	Mapping system	√ Coverage mapping system addressed in the NBP	√ The required layers listed in the NBP	√	√ e.g.annual monitoring of the subscriptions foreseen in the NBP	√	√ AGCOM (for subscription analysis), MISE & Infratel (for coverage mapping) as the responsible authorities
		√ Establishment of a cadastre of the utility infrastructure (existing and planned) addressed in the NBP	√ All details concerning the content of the Cadastre is explained in the NBP	×	×	√	√ The tool is planned to be coordinated by Infratel Italia
		√ Efficient use of existing infrastructure	√ Establishment and compulsory use of a Cadastre of utility infrastructures underground to monitor the roll outs and to take full advantage of the existing infrastructure	√	√ Functions and different layers of the Cadastre system explained in the NBP	√	√ – The tool is planned to be coordinated by Infratel Italia – The National Association of Italian Municipalities should coordinate and support municipalities (and maybe endorse with sanctioning powers) towards using the tool
Cost reduction	√ Coordinated management of underground facilities	√	√	√	√	√	√
	√ Incentives aimed at lowering deployment costs by simplifying and reducing administrative charges	×	×	×	×	×	×
	√ Compulsory installation of vertical cabling for all new constructions and renovations	×	×	×	×	×	×
DEMAND SIDE MEASURES	√ Public services connectivity (i.e. schools, libraries etc.)	√ One strategic target of the NBP is to provide access to broadband connection services of at least 100Mbps for public administration, local schools, health care facilities, industrial parks, high demographic density areas	×	×	×	×	×
	√ Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	√ High speed internet infrastructure and services are considered to be important for the entire economic and social environment.	√ Voucher schemes for the end-users to migrate to new networks	×	×	√	√ Responsible authorities are defined in the NBP (especially AGID is responsible for Digital economy and services stimulation)
	√ Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	√ Public services efficiency as an important target in the NBP	√ Dissemination activities by the Digital Champions	√ Demand aggregation	×	√	√



### Latvia – All measures defined by NBP

Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
	Topics	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
			√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures		
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	Horizontal and vertical coordination measures as well as involvement of stakeholders	√	Links and overlaps with other horizontal policy measures and programmes are comprehensively addressed in the NBP	x			
		Monitoring and updating mechanism (i.e. interim assessments)	√	Regular evaluation and update of the strategy is foreseen	√	– Measurable indicators as well as timelines (e.g. the spent sources) are addressed in the NBP to be monitored every 2 years – The final assessment is planned to be carried out in 15 June 2019	√	The Ministry of Transport as the main responsible authority
	Regulation (i.e. access obligations, regulated prices and reference offers)	√	NBP considers regulatory frameworks (i.e. access and sharing of network infrastructure etc.) as an important measure to support achieving the target	√	The NBP set targets to update some of the current regulatory frameworks	x		√



## Latvia – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP							
		√x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
				√x	if Yes, concrete measures	√x	if Yes, concrete measures		√x	if Yes, concrete measures	
TRANSPARENCY MEASURES	Mapping system	x	Coverage and service mapping tool	x		x		x			
		√	Infrastructure mapping showing the existing private and public networks and planned investments	x	The establishment of a central infrastructure (existing and planned) system is proposed by the NBP	x		x			
		√	Use of existing infrastructure	√	Stimulation of infrastructure sharing	√	Establishing an infrastructure database, containing information on the location, capacities, and other physical parameters of infrastructure accessible to all operators as well as government departments	x		x	
DEMAND SIDE MEASURES	Demand stimulation	x	Coordination of civil works	x		x		x			
		x	Permit granting and electronic counters	x		x		x			
		x	Building readiness	x		x		x			
DEMAND SIDE MEASURES	Demand stimulation	√	Public services connectivity (i.e. schools, libraries etc.)	x	The NBP addresses the importance of connecting public services with superfast broadband	x		x			
		√	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	√	The impact of superfast internet on the development of economy, society and new generation of public e-services is mentioned in the NBP	√	– Implementation of the electronic skill governmental plan – Organizing information campaigns and events (e.g. e-skill week) – Organizing awareness-raising activities (television, radio and other communication channels)	√	The NBP sets measurable targets, timelines and required yearly budget for demand stimulation activities	√	Most demand stimulation measures being coordinated by the Ministry of Regional Development
		√	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	√		√		√		√	

## Lithuania – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
Topics		How are the measures addressed ?		if Yes, concrete measures		if Yes, concrete measures			
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	Horizontal and vertical coordination measures as well as involvement of stakeholders	√	Competences of the main actors are addressed	√	Establishment of the „Placūjuostis internetas“ as the main public organization responsible for implementation of the broadband strategy	x	√	The Ministry of Transport as the main responsible authority in coordinating the plan and its implementation
		Monitoring and updating mechanism (i.e. interim assessments)	√	The NBP proposes a regular monitoring procedure for implementation and update of the plan	√		x	√	
	Regulation (i.e. access obligations, regulated prices and reference offers)	√	- Creating the regulatory environment for encouraging competition in broadband market and use of services are prioritized in the NBP - References to the EU regulations and guidelines are existent	√	- e.g. broadband internet services pricing and tariffs, access and sharing regulations, etc. - Providing infrastructure services pricing policies	x	√	√	NRA as the main responsible authority

## Lithuania – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		v/x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed v/x if Yes, concrete measures	
				v/x	if Yes, concrete measures	v/x	if Yes, concrete measures		
Topics	Measures/Plan for public investments	v	Public interventions (funding and financing) are of high importance in realization of the Lithuanian broadband plan (especially the structural funds)	v	The required amount of funding resources - for the implementation of the strategy - is quantified (respective feasibility studies are existence)	v	Measurable indicators as well as the respective timelines are addressed in the NBP	v	The responsible authorities are listed for each of the action areas
		v	Available budgetary resources (their share & adequacy)	x	Funding sources for different projects are introduced by NBP	v		v	
		v	Description of potential/preferred business models	x	Alternative business models are addressed (i.e. consumer initiative model, joint venture, public DBO etc.)	v		v	
		v	Measures to stimulate private investment	v	The strategy emphasizes on the role of private investment in realization of the plan	v	<ul style="list-style-type: none"> <li>- Establishing frameworks for reducing the deployment costs and enhancing coordination</li> <li>- Risk management assessment prior to implementation</li> <li>- New infrastructure services pricing policies</li> <li>- Establishing the electronic communications networks information system</li> </ul>	v	
		v	Investment priorities (i.e. in rural & remote areas)	v	Ensuring the geographically uniform high-speed broadband infrastructure (especially areas with market failure) is the main priority	v	Concrete projects focusing on covering rural areas (i.e. RAIN and RIP)	v	
		x	Promotional measures	x		x		x	
Technology	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	v	Mobile and wireless networks complementary to fixed networks, especially for remote areas	v	<ul style="list-style-type: none"> <li>- Frequency auction release (i.e. authorization of the 800 MHz radio frequency band for 4G/LTE as well as new sources of 2.3 GHz and 2.5 GHz by 2017)</li> <li>- Providing mobile infrastructure by public investments and making them available for operators under equal and none discriminatory conditions</li> </ul>	v	Indicators and timelines are addressed in the NBP	v	
		v	Fixed broadband technology focus/priority	x	The focus is to develop fiber networks (i.e. there are plans to cover 5 major cities (fully) and regional centers (80%) with fiber in the next few years)	v	Indicators and timelines are addressed in the NBP (i.e. the NBP has set targets concerning the share of fiber connection to households by 2020)	x	
<b>SUPPLY SIDE MEASURES</b>									

## Lithuania – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP				
		How are the measures addressed ?		Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed		
		Vx	How are the measures addressed ?	Vx if Yes, concrete measures	Vx if Yes, concrete measures	Vx if Yes, concrete measures	Vx if Yes, concrete measures	
TRANSPARENCY MEASURES	Mapping system	x	Coverage and service mapping tool	x		x	x	
		v	Infrastructure mapping showing the existing private and public networks and planned investments	x		x	x	
	Cost reduction	v	Use of existing infrastructure	v	– Establishing the broadband infrastructure registry – Improving the regulatory mechanisms for cost sharing and use of infrastructure	x	x	x
		v	Coordination of civil works	v		x	x	
		v	Permit granting and electronic counters	v		x	x	
		x	Building readiness	x		x	x	
DEMAND SIDE MEASURES	Public services connectivity (i.e. schools, libraries etc.)	v	Connectivity of public services are of high priority in the NBP (especially in more remote areas)	v	Libraries for innovation (Free internet access in public libraries) as a pilot initiative introduced in the NBP	x	x	
		v	Encouraging the use of e-services as one of the targets of NBP – Digital skills as an important factor in achieving the take up target. Comprehensive public contribution is needed to communicate and create capacities for digital services which stimulates the use of internet services – The importance of superfast internet for businesses and public services addressed in the NBP	v	– Supporting measures (i.e. free internet access for households with economic/social problems) – Reducing access prices for end users in more remote areas – Involving local communities for training and capacity building programmes – Establishing education and training campaigns	v	x	x
	v	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	v					

### Luxembourg – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP			
		✓x	How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed	
Topics		✓x	How are the measures addressed ?	✓x if Yes, concrete measures	✓x if Yes, concrete measures	✓x if Yes, concrete measures	
REGULATORY & ORGANISATIONAL MEASURES	Organization & Management	✓	Participation of the actors is of high importance	✓	Regular thematic consultations with all stakeholders (i.e. to ensure follow-up of the action plan)	x	x
	Horizontal and vertical coordination measures as well as involvement of stakeholders	✓	– The NBP sets interim targets for 2015 – The NBP addresses a regular review and evaluation of the plan	x		✓	The NBP has set targets both for upload and download speeds and their respective timeframes
	Monitoring and updating mechanism (i.e. interim assessments)	✓	The government intention is to develop a new regulatory framework to fasten the network deployment and enhance private investment (open and transparent network access)	✓	– Regulatory measures for competitive wholesale prices – Putting in place price monitoring mechanisms by competent authorities – Measures to ensure access to local loop – Obligation to roll out associated facilities for optical fiber (i.e. empty ducts)	x	✓

### Luxembourg – All measures defined by NBP

		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
Topics	Measures	How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures
Supply Side Measures	Funding and financing	x		x		x		x	
		x		x		x		x	
		x		x		x		x	
		v	The government does not intend to support the implementation of NBP with public financing and therefore, emphasizes on creating a suitable environment for private investment	v	– Measures to reduce the cost of broadband deployment – Ensuring access to local loop (this will allow an optimized return on investment) – Obligation to roll out associated facilities for optical fiber (i.e. empty ducts) – Regulatory frameworks for open and transparent network access	x		x	
		x		x		x		x	
		x		x		x		x	
Technology	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	v	Mobile and wireless (as well as satellite) technologies considered as complementary solutions	v	Frequency policy should be adapted to the objectives of the action plan, in particular by an optimal exploitation of the digital dividend and by putting in place a favourable framework for the use of new mobile technologies (e.g. 4G networks).	x		x	
	Fixed broadband technology focus/priority	v	Optical fiber is considered as the only solution to achieve the NBP targets (but in the short term, it aims at increasing the performance of existing networks)	x		x		x	



## Luxembourg – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
	Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
			√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures			
TRANSPARENCY MEASURES	Mapping system	Coverage and service mapping tool	x		x		x		
		Infrastructure mapping showing the existing private and public networks and planned investments	x		x		x		
	Cost reduction	Use of existing infrastructure	√	– The NBP emphasizes the importance of cost reduction measures to stimulate private investment and fasten the pace of broadband deployment	√	– Putting in place the national construction work register and the national infrastructure register	x	√	The ILR (NRA) is appointed as the responsible authority for establishing the national infrastructure register
		Coordination of civil works	√	– Enhancing the access to infrastructure, coordination of civil work as well as faster permit issuance procedures are topics addressed in the NBP	√		x	√	
		Permit granting and electronic counters	√	– Obligatory in-house wiring in new buildings as a challenging topic (considering the existing building ownership modalities)	√		x	√	
	Building readiness	√	– The NBP sets targets of full access of all public administration, academic institutions and research centers to ultrafast connections	√	Stimulating the participation of local authorities in taking the necessary measures to provide new buildings with empty ducts and equipments necessary for extension of fiber networks	x	x		
DEMAND SIDE MEASURES	Demand stimulation	Public services connectivity (i.e. schools, libraries etc.)	√	– The socio-economic impact of superfast internet is emphasized in the NBP	x		x		
		Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	√		√	– An upgrade in terms of connectivity of both governmental administrations and academic institutions	√	There are measurable indicators for some of the targets accompanied by timelines for their implementation	
	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	√		√	– Creation of economic activity zones connected to very high-speed broadband to secure business access to telecommunication services	√		x	

### Malta – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
		√x		√x	if Yes, concrete measures	√x	if Yes, concrete measures	√x	if Yes, concrete measures
REGULATORY & ORGANISATIONAL MEASURES Organization & management	Horizontal and vertical coordination measures as well as involvement of stakeholders	√	Participation of stakeholders as high importance factor for the government's digital strategy. Here a consultative approach will continue during the life-time of the Strategy.	√	<ul style="list-style-type: none"> <li>– Extensive consultative process for preparation of the strategy (i.e. consultation workshops with public &amp; private ICT stakeholders)</li> <li>– Discussions with involved stakeholders in the eventual implementation and ownership of parts of the strategy</li> </ul>	x		√	The digital agenda presnets an organigram containing the main operational bodies in implementation of the strategy
	Monitoring and updating mechanism (i.e. interim assessments)	√	The strategy will be continually monitored by the Governing Body	√	Reports will be presented on qualitative and quantitative assessments of progress	√	The digital agenda sets measurable performance indicators with their respective timelines	√	i.e. the MCA will monitor supply and demand of broadband, anticipating change, supporting development and facilitating the deployment and development of NGA Networks in Malta
	Regulation (i.e. access obligations, regulated prices and reference offers)	√	Digital Malta strategy contains a pillar dedicated to continuous enhancement of the ICT regulatory framework in Malta	√	The strategy foresees actions for: <ul style="list-style-type: none"> <li>– Sufficient radio spectrum</li> <li>– Infrastructure based competition</li> <li>– Frameworks for network infrastructure sharing</li> </ul>	x		√	The MCA regulatory regime will foster innovation and investment to support the development of NGA Networks in Malta. It will have the objectives of ensuring competition and affordable access to these networks.

## Malta – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP							
		√x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
				√x	if Yes, concrete measures	√x	if Yes, concrete measures		√x	if Yes, concrete measures	
Supply Side Measures	Funding and financing	√	The Digital Strategy addresses that the government and the private sector will invest in network infrastructures and technologies, however does not quantify the public interventions	x		x		x			
		x	Available budgetary resources (their share & adequacy)	x		x		x			
		x	Description of potential/preferred business models	x		x		x			
		√	Measures to stimulate private investment	√	Engaging private sector as an important player in the delivery of the Strategy	x		x		MCA as the main responsible regulatory body	
		x	Investment priorities (i.e. in rural & remote areas)	x		x		x			
		x	Promotional measures	x		x		x			
Technology	√	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	√	Mobile and wireless technologies are considered as complementary solutions to fixed networks	√	The regulatory framework shall support investment in new broadband networks and stimulate infrastructure-based competition – Introduction of risk mitigation measures	x		x		MCA as the main responsible regulatory body
	x	Fixed broadband technology focus/priority	x		x		x		x		

## Malta – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		v/x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
				v/x	if Yes, concrete measures	v/x	if Yes, concrete measures		v/x	if Yes, concrete measures
TRANSPARENCY MEASURES	Mapping System	x		x		x		x		
		x		x		x		x		
	Cost reduction	v	The digital agenda proposes measures to stimulate the infrastructure sharing opportunities	v	A framework to facilitate and regulate network infrastructure sharing will be established to safeguard the long-term growth and development of the telecommunications sector, while ensuring healthy competition	x		x		
		x		x		x		x		
		x		x		x		x		
		x		x		x		x		
	DEMAND SIDE MEASURES	Public services connectivity (i.e. schools, libraries etc.)	v	Malta focuses on demand side stimulation measures by setting goals and guiding principles as well as actions in the following areas: – Digital Citizen – Digital Businesses – Digital Government – Human Capital	x		x		x	
			v		v	– Education and awareness programme implemented at community level (with a major focus on disadvantaged groups) – Digital Citizenship will become part of the National Education Curriculum, aiming at equipping children and youths with the abilities to interact and use the Internet safely and intelligently – Empowering programmes for ageing and disadvantaged groups – Internet accessibility standards will be promoted to enable everyone, irrespective of disability, to navigate and access content via assistive technologies – Free access to wireless internet in public buildings, main squares and many public spaces – Portable devices will be provided for children, their teachers and LSAs as part of the government's educational vision – etc.	v	There are measurable indicators set by the digital agenda for: – population subscription – internet regular users – disadvantaged people using internet regularly – etc.	x	
		Demand stimulation	v		v	For digital businesses: – ICT initiatives for sectors facing stiff competition – Forum for the transformation of industries through ICT – ICT capability framework for SMEs and co-operatives – ICT training programmes For digital government: – Making e-services easy to use and available on mobile devices – Realizing the one-stop shop concept – Assisting departments and entities to adopt technology that integrates cross-departmental services – Establishing sector specific programmes – Promotion of the IPv6 protocol	v	There are measurable indicators set by the digital agenda for: – e-commerce (buying and selling online) – e-government (use of e-government services and returning forms)	x	

## Netherlands – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP								
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed				
		√x		√x	if Yes, concrete measures	√x	if Yes, concrete measures	√x	if Yes, concrete measures			
Topics	REGULATORY & ORGANISATIONAL MEASURES	Organization & management	Horizontal and vertical coordination measures as well as involvement of stakeholders	√	Coordination activities especially at local level is one of the main priorities of the government	√	<ul style="list-style-type: none"> <li>– Establishment of the task force on Next Generation Networks (NGN)</li> <li>– Knowledge sharing (i.e. establishment of a foundation called City Link [StichtingStedenlink] aiming at organising and coordinating local activities and to act as an intermediary in the discussions between municipalities, provinces and central government)</li> <li>– Establishment of the guidelines (i.e. NGN task force guide for local governments)</li> </ul>	x		√	The Ministry of Economic Affairs, Agriculture and Innovation as the initial responsible authority for City Link programme.	
			Monitoring and updating mechanism (i.e. interim assessments)	√	Regular monitoring the development of broadband in light of the ambitions for 2020 (i.e. annual roll-out progress monitoring)	x		x		x		
			Regulation (i.e. access obligations, regulated prices and reference offers)	√	In the government's view, it is mainly up to the market to invest in new-generation networks. The government will create the basic conditions required for an efficient market that encourages companies to invest in infrastructure (for example, by imposing a number of obligations on companies with regard to transparency)	√	Providing a new regulatory framework (i.e. concerning the access to physical infrastructure and network connections)	x		√		√

### Netherlands – All measures defined by NBP

Topics		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
				√x	How are the measures addressed ?	√x	if Yes, concrete measures		√x	if Yes, concrete measures
SUPPLY SIDE MEASURES		Measures/Plan for public investments	x		x		x		x	
		Available budgetary resources (their share & adequacy)	x		x		x		x	
		Description of potential/preferred business models	x		x		x		x	
		Measures to stimulate private investment	√	The basic principle of the digital agenda is that rolling out the broadband services is a task for the market	x	Establishing a better regulatory framework to stimulate the competitive environment	x		x	The Ministry of Economic Affairs, Agriculture and Innovation and ACM as the main responsible authorities
		Investment priorities (i.e. in rural & remote areas)	√	Special attention is on rural areas and improving their connectivity	√	Advisory report on the role of municipalities and provinces in rolling out NGN	x		x	
		Promotional measures	x		x		x		x	
Technology		Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	√	Mobile and wireless technologies as complementary to fixed networks	√	Auctioning of more mobile frequencies for accommodating the rapid growth of mobile internet	x		x	
		Fixed broadband technology focus/priority	√	Technology neutral, but according to the strategy cable and optical fibre seem to be a better proposition in the long term than a purely copper network	x		x		x	

## Netherlands – All measures defined by NBP

Topics		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP				
		Measures	How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed		
		√x	How are the measures addressed ?	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	
TRANSPARENCY MEASURES	Mapping system	x		x		x		
		x	Infrastructure mapping showing the existing private and public networks and planned investments	x		x		
	Cost reduction	v	The digital strategy believes that the local government's principal task is to create the right conditions, such as planning and coordinating excavation work, shortening and reducing the costs of licensing procedures and promoting the development and use of applications and services.	v	The relevant regulatory and statutory frameworks for local authorities are set by the Ministry of Economic Affairs, Agriculture and Innovation's guide "Goed op weg met breedband"		x	
		v	Coordination of civil works	v			x	
		v	Permit granting and electronic counters	v			x	
		v	Building readiness	v			x	
DEMAND SIDE MEASURES		x	Public services connectivity (i.e. schools, libraries etc.)	x		x		
	Demand stimulation	v	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	v	One focus area in the NBP is enhancing the digital skills of the people	x		
		v	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	v	The digital agenda emphasizes the benefits of ICT on economic growth and improvement of public services delivery		x	

## Poland – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
Topics		✓x		✓x	if Yes, concrete measures	✓x	if Yes, concrete measures	✓x	if Yes, concrete measures
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	✓	The new NBP prefers a centralized steering approach with the Department of Digital Development (currently the ministry of digitization) as the main responsible authority in broadband development in Poland	✓	<ul style="list-style-type: none"> <li>– Concentrating the broadband support through a dedicated department (centralized approach)</li> <li>– Introduction of interconnection and competences of stakeholders</li> <li>– Preparation of the code of good practice (for ICT stakeholders and specially the local authorities)</li> <li>– Establishing a coordination center for efficient implementation and interconnection of projects (as well as supporting actors to access the EU funds and monitoring the utilization of the funds and projects progress)</li> <li>– Focusing on coordination of the design and deployment to avoid inefficiencies occurred in the previous programme period</li> </ul>	x		✓	Department of Digital Development (competences recently shifted to the Ministry of Digital Affairs) as the main responsible coordinator body. Supported by the digital Poland project center and the office of electronic communication (UKE)
		✓	The NBP expects guidelines and advisory measures to be provided by the central steering institution (the Digital Development Department)	✓	<ul style="list-style-type: none"> <li>– Marshal's offices (regional governments) as the responsible dedicated bodies for monitoring the progress of projects in different regions</li> <li>– The NBP emphasizes that all required actions will be taken and updated based on data collected as part of annual survey by the Office of Electronic Communications inventory (covering information on services and coverage of existing telecommunications infrastructure)</li> <li>– An interim evaluation of the strategy is planned for the end of 2017</li> </ul>	✓	Most of the measures are quantified with their respective timelines	✓	The Ministry Ministry of Digital Affairs as the main coordinating authority
	✓	Regulatory measures are emphasized to create better competition environment and stimulate private sector investment	✓	<ul style="list-style-type: none"> <li>– The operator of the network using the support of the ERDF funds has to provide wholesale access on non-discriminative basis for all parties interested for 7 years (in the case of passive infrastructure – with no time-limit)</li> <li>– The framework agreement offer has to be prepared with details on access modes, network topology and minimum set of wholesale services consisting of access to bitstream, local loop and to passive infrastructure (dark fibre, ducts, poles, collocation space)</li> <li>– Improving the standards and rules of cooperation with alternative operators</li> </ul>	x		✓	UKE as the main regulatory authority	



## Poland – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		✓x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
				✓x	if Yes, concrete measures	✓x	if Yes, concrete measures		
SUPPLY SIDE MEASURES	Funding and financing	✓	The NBP considers public funding as a prerequisite to achieve the targets and therefore, quantified the total required budget for plan realization	✓	– The NBP sets a call mechanism for allocation of the available fundings for the eligible priority areas – The NBP puts guidelines & provisions for parties aiming to access the funds for safeguarding the relevance and contribution of the projects to the strategy targets	✓	The already utilized investment as well as the planned investments through public/private sources are addressed	✓	Roles and responsibilities of the actors listed in the NBP
		✓	The sources and amount of required funding are addressed in the NBP	✓	The NBP provides detailed information on the future planned network construction and respective investment needs	✓		✓	
		✓	Investment and business models are described in the NBP	✓	– There are restriction for choosing business models for parties using the public funds to ensure the efficiency of the funding utilization – Promotion of PPP solutions in the field of telecommunications, especially in minimizing concerns relating to cooperation of local government bodies and private partners as a priority	✓	Timeline for the actions are set in the NBP	x	
		✓	The NBP expects an active contribution of private investment in realization of the strategy	✓	– Amending the existing legal and regulatory environment (i.e. aiming at reducing the cost for broadband deployment) – Considering issues concerning minimizing duplication of infrastructure, coordination of investments between public and private bodies, use of existing infrastructure, determining areas of public intervention, etc.	✓	NBP provides information on the planned/expected investment by private investors	✓	UKE as the main regulatory responsible authority together with the ministry of digitization
		✓	Some of the main priority axis are: – Connecting public services (especially schools and health centers) – Rural and remote areas where there is no economically viable solution for broadband technologies development	✓	The dedicated amount of financial support for the priorities are addressed by the NBP	✓	NBP provides information on the projected & planned investments in different priority areas using 3 different scenarios (optimistic, realistic, pessimistic)		
		x		x		x		x	
Technology	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	✓	Mobile and wireless technologies as bridging solutions and complementary to fixed broadband technologies	✓	– Support for public investments in wireless network telecommunications – New frequency release and plan for future frequency auctions (use of the digital dividend)	✓	Timeline for the actions as well as quantified investment requirements for wireless technologies are set in the NBP	✓	Roles and responsibilities of different participating actors are listed in the NBP
	Fixed broadband technology focus/priority	✓	Technology neutral with preference of fiber networks	✓	Description of different preferred technologies & network architecture	✓	The NBP provides cost scenarios using different technologies (FTTH, VDSL, HFC as well as LTE) & network architecture	x	

## Poland – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization level of proposed measures by NBP					
	Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
			√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures		
TRANSPARENCY MEASURES	Mapping system	Coverage and service mapping tool	√ Introduction of broadband infrastructure information system as the main source of information on the telecommunication infrastructure	√	√	√	Roles and responsibilities of different participating actors are listed in the NBP	
		Infrastructure mapping showing the existing private and public networks and planned investments	√ Providing the inventory of the telecommunication infrastructure as a priority in the NBP	√	√	√	Roles and responsibilities of different participating actors are listed in the NBP	
		Use of existing infrastructure	√ The NBP emphasizes measures for reducing the cost of broadband deployment	√	√	√	Roles and responsibilities of different participating actors are listed in the NBP	
	Cost reduction	Coordination of civil works	√	√ – Active promotion of legal and regulatory environment (i.e. regulation on using synergies of existing energy infrastructure) – Memorandum of cooperation regarding the construction and development of passive infrastructure (between national and local governments as well as telecommunication market) – Establishing the infrastructure database	√	√	√	Roles and responsibilities of different participating actors are listed in the NBP
		Permit granting and electronic counters	√	√ – Searching for synergies with future projects in the field of public roads, railways and water supply and sewage, etc. (providing full information of infrastructure and the possibility of joint realization) – Establishing the infrastructure mapping system	√	√	√	Roles and responsibilities of different participating actors are listed in the NBP
		Building readiness	√	√ – Guidelines/regulations in streamlining the procedures – Supporting measures and guidelines for local authorities in minimizing the request time – Development of the Code for in-building good practices as well as assessments for upgrading possibilities of the existing buildings	√	√	√	Roles and responsibilities of different participating actors are listed in the NBP
DEMAND SIDE MEASURES	Demand stimulation	Public services connectivity (i.e. schools, libraries etc.)	√ Connecting public services (e.g. schools and health centers) as a priority in the NBP	√	√	√	Roles and responsibilities of different participating actors are listed in the NBP	
		Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	√ Improvement of digital competences of the society is considered as an investment area with the focus on supporting the development of the basic and medium-level skills, the ability to use public and commercial e-services, support of high-level competences of the most talented students and programmers with a view to develop innovative ICT-oriented solutions	√	√	√	Roles and responsibilities of different participating actors are listed in the NBP	
		Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	√ E-government services are a priority for investment in the NBP focusing on improvement of high quality e-services, back-office administrative processes and access to and use of public sector information	√	√	√	Roles and responsibilities of different participating actors are listed in the NBP	

### Portugal – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures
REGULATORY & ORGANISATIONAL MEASURES	Organization & Management	V	Horizontal coordination among authorities and institutions (especially at national level) is of high importance in the digital agenda	V	– Creating an interministerial commission for digital agenda coordination and monitoring			V	The agenda lists all responsible authorities for each of the action lines mentioned in the strategy
		V	The Agenda proposes the establishment of a Monitoring Committee for regular control and update of the strategy	V	– Creating a Monitoring Committee – Determining internal frameworks which enhances the efficiency of the Monitoring Committee actions	V	Regular annual monitoring & update of the strategy is proposed in the Agenda	V	The agenda provides details on the list of the relevant departments and agencies participating in the Monitoring Committee
	V	Ensuring open access to existing infrastructure and buildings, suitable for the accommodation of electronic communications networks		x		x		x	

### Portugal – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		√x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
				√x	if Yes, concrete measures	√x	if Yes, concrete measures		√x
Supply Side Measures	Funding and financing	√	The NBP considers both public (state and EU) as well as private investment in securing the implementation of the strategy	x		x		x	
		x	Available budgetary resources (their share & adequacy)	x		x		x	
		x	Description of potential/preferred business models	x		x		x	
		x	Measures to stimulate private investment	√	e.g. ensuring open access to existing infrastructure and buildings, suitable for the accommodation of electronic communications networks	x		x	
		x	Investment priorities (i.e. in rural & remote areas)	x		x		x	
		x	Promotional measures	x		x		x	
Technology	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	√	Mobile solutions are addressed as a technology to support the full coverage of the territory	√	– Frequency release programmes – Reserving the 694–790 MHz for mobile broadband systems	x		√	ANACOM as the main responsible authority
	Fixed broadband technology focus/priority	x		x		x		x	

## Portugal – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
		Vx	How are the measures addressed ?	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures		Vx	if Yes, concrete measures
TRANSPARENCY MEASURES	Mapping system	x		x		x		x		
		V	A centralized information system is addressed in the Agenda (ensuring open access to existing infrastructure and buildings, suitable for accommodation of electronic communications networks)	x		x		V	ANACOM introduced as the main responsible authority	
	Cost reduction	x		x		x		x		
		x		x		x		x		
		x		x		x		x		
		x		x		x		x		
		x		x		x		x		
DEMAND SIDE MEASURES	Public services connectivity (i.e. schools, libraries etc.)	V	Connecting public services as a general measure addressed in the NBP	x		x		x		
	Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	V	The focus of the digital agenda is on stimulating innovation and knowledge within society – Promoting the use of ICT in education and learning – Improving the digital skills by training and stimulating the digital participation of people – Stimulating the creation of digital content – The Digital Agenda defines objectives to strengthen competitiveness and internationalization of businesses & companies, especially small and medium enterprises through innovation and qualified entrepreneurship – The Agenda also intends to enhance the provision of quality public services	V	– Further installation of smart meters for the public and private buildings – Simplifying e-services for easier access (especially for disadvantaged groups) – Intensifying the use of ICT services and products in main public services (e.g. education and health)	V	The agenda sets measurable indicators as well as concrete actions with respective timelines for their implementation	V	The agenda lists the responsible authorities for each of the action lines	
Demand stimulation	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	V	– The Digital Agenda defines objectives to strengthen competitiveness and internationalization of businesses & companies, especially small and medium enterprises through innovation and qualified entrepreneurship – The Agenda also intends to enhance the provision of quality public services	V	– Guidelines and supporting measures for further development of interoperable public administration – Creating a national web services directory (providing e-services through a single information point such as e-health, e-administration or e-education services) – Further investment in R&D projects – Setting quality assurance mechanisms for public services (i.e. ISO certificates) – Creating an application for complaint management – Promote the creation of start-ups and consolidate the ICT sector companies	V		V		

## Romania – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP				
		How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed			
Topics		V/x	V/x if Yes, concrete measures	V/x if Yes, concrete measures	V/x if Yes, concrete measures	V/x if Yes, concrete measures		
REGULATORY & ORGANISATIONAL MEASURES	Horizontal and vertical coordination measures as well as involvement of stakeholders	V	The primary objective of the NBP is the definition and planning of political and administrative measures that can stimulate the development of the next generation broadband infrastructure and, respectively, the penetration of high speed access services. In doing so, consultation, coordination and participation of different stakeholders are of high importance and comprehensively addressed	V	Multi round consultation and discussions with ICT stakeholders in preparation of the NBP – Future consultation on measures relevant to broadband development are planned	X	V	The NBP provides a list of different actors and their expected contribution in preparation and realization of the plan
		V	The NBP proposes mechanisms for regular monitoring of the plan	V	The NBP proposes settings & regulatory frameworks as well as expert groups on the following stages: – Monitoring the construction phase – Network monitoring, management, maintenance and operation	V	Broadband objectives together with timelines presented in the NBP (in three periods: 2014–15, 2016–17, 2018–20)	All beneficiaries of state aid should submit progress reports on the state of implementation during the construction of the NGN networks to the Ministry of Information Society. Expert teams of auditors (technicians/engineers, economists, accountants, etc.) will be appointed by the Ministry to regularly check the physical and financial implementation of each project.
	Regulation (i.e. access obligations, regulated prices and reference offers)	V	The NBP has a section dedicated to legislative frameworks where the main national and EU regulations are addressed	V	Most addressed frameworks emphasize creation of better competition environment. Some examples are: – The right to access to the property – The shared use of infrastructure – Regulations for reducing the cost of deployment – Wiring for building new access to broadband networks – Access and interconnection (as well as cost orientation tariffs) – Inventory of public electronic communications networks – etc.	X	X	X

## Romania – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP							
	Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
			Vx	if Yes, concrete measures	Vx	if Yes, concrete measures				
SUPPLY SIDE MEASURES	Funding and financing	Measures/Plan for public investments	V	Funding for the NGN program is foreseen to come from the EU budget for 2014–2020, alongside private funds and Romanian public sector contributions via the national and local budgets	V	The NBP believes that the alternative measures (i.e. demand stimulation) or regulatory measures will not make it possible to achieve the objective of service availability of high-speed internet access without state aid support. It also provides detailed information on the methodology for calculation of the costs (market analysis) – Setting & publishing criteria on tendering and selection of projects by the granting authority	V	The NBP provides measurable indicators and calculations for projecting the required investments in broadband development projects	V	– Each awarded contract will be monitored during implementation and operation of the network in accordance with the Structural Funds regulations – In accordance with the European Commission guide of state aid for the rapid deployment of broadband networks, a mechanism for claw-back for a period of 10 years will be provided for each such developments
		Available budgetary resources (their share & adequacy)	V	The NBP addresses the required investments for network deployment (i.e. in backbone and access) and the projected sources	V		V	The NBP provides information on expected funding (public and private) for different development scenarios	X	
		Description of potential/preferred business models	V	Different possible business models in accordance with the European guidelines are introduced	V	A general target is to stimulate public/private investment The NBP believes that the largest share of financing infrastructure will be achieved through DBO models	V	Procedures/workflows as well as compatibility of different models are addressed in the NBP	X	
		Measures to stimulate private investment	V	Stimulating investment by the private sector as well as identification of measures to reduce costs and increase efficiency are of high priority	V	– Setting a competitive bidding procedure – Access to infrastructure by utility companies – Improving transparency on the mapping of existing infrastructure			X	
		Investment priorities (i.e. in rural & remote areas)	V	Implementation of rural broadband infrastructure (in white areas) as one of the main priorities in the NBP	V	– Defining concrete projects (i.e. RONE) focusing on covering rural areas – Encouraging local authorities to contribute to projects with funding from European sources or from the national budget in the form of public/private partnerships	V	The NBP provides measurable indicators and calculations for projecting the required investments in rural areas broadband development project	X	
		Promotional measures	X		X		X		X	
		Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	V	Utilizing next generation wireless technology for accelerated expansion/implementation of rural broadband infrastructure is addressed as one of the main pillars in the NBP	V	Emphasis on the expansion of mobile technologies (i.e. LTE, WiMAX, etc.) in lower population density areas, as well as urban areas where deployment is 'difficult' (i.e. city centres)	V	– The NBP provides measurable targets for different time periods (i.e. on coverage as well as reducing prices for connection) – Providing details on the frequency auction release programmes (i.e. the EU harmonized frequency band)	V	– The NBP provides measurable targets for different time periods (i.e. on coverage as well as reducing prices for connection) – Providing details on the frequency auction release programmes (i.e. the EU harmonized frequency band)
Fixed broadband technology focus/priority	V	The construction of fibre-optic networks with national coverage and wide spread distribution points, as close to the end-user as possible and appropriate levels of symmetry and interaction to ensure better transmission of information in both directions	V	The NBP provides technology scenarios for different types of areas in relation to their development cost	X		X			

## Romania – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
Topics		√x		√x	if Yes, concrete measures	√x	if Yes, concrete measures	√x	if Yes, concrete measures
TRANSPARENCY MEASURES	Mapping system	√	The NBP refers to a service mapping (coverage of services) provided by the NRA as the main source of identifying the development needs					√	ANCOM will carry out an inventory of public electronic communications networks
		√	Establishing a central infrastructure registry foreseen in the NBP	√	The aid beneficiary must provide all relevant information about the broadband network to a central register of broadband infrastructures, developed by ANCOM and/or at the local government level.				
	√	The NBP emphasizes on the importance of cost reduction measures in achieving the targets by introducing the following pillars: – Encourage access to existing passive infrastructure – Improve transparency and coordination in civil works – Simplify procedures for authorizing construction of electronic communications networks – Establish rules on NGN infrastructure for new buildings	√	– Regulation on the shared use of the infrastructure (i.e. the aid beneficiary is obliged to provide entitled third parties full and non-discriminatory access to information on its infrastructure (including, inter alia, ducts, street cabinets and fibre) deployed under state aid) – Existing physical infrastructures should be managed by a single information point which allows access to information in electronic format – Developing a system to inform operators of the planned civil works by local authorities	√	The NBP provides detailed information on the procedures, as well as regulatory frameworks for each of the measures (together with timelines for implementing the actions)	√	The NBP provides a list of different actors and their expected contribution in better realization of the cost reduction measures	
	√	Coordination of civil works	√	– Inventory of public electronic communications networks – Increasing transparency and coordination between public authorities involved	√		√		
	√	Permit granting and electronic counters	√	– Regulation on wiring for building new access to broadband networks – Defining requirements and the inclusion of these requirements in the criteria for the granting – Ensuring non-discriminatory access to terminating segments of NGA	√		√		
DEMAND SIDE MEASURES	Public services connectivity (i.e. schools, libraries etc.)	x		x		x		x	
		√	– Affordable, good quality and interoperable services to stimulate the take-up by citizens (including the disadvantaged groups), businesses and public administration addressed in the agenda – The description of ICT implications in education, health, culture as well as social inclusion	√	– Stimulation of the implementation of online service/platform for information – Implementation of tax incentives – Increase computer literacy (e.g. life long learning programmes) – Providing subsidies for the purchase of IT equipment	√	The NBP refers to demand side measurable indicators as well as timelines addressed in the digital agenda strategy Romania	x	
	√	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	√	Stimulating businesses, public administration and public and private services (national and cross-border) are topics covered by the NBP	√	– Improving productivity of the private sector by reducing administrative barriers in their relationship with the state – Strengthening and ensuring the interoperability of information systems – Modernising public administration and reducing administrative costs – The use of open data and ensuring interoperability in public institutions – Promoting national and cross-border e-commerce	√		x



### Slovakia – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP		Responsibilities and monitoring mechanism addressed				
		vx	How are the measures addressed ?	vx	Implementation of measures addressed	vx	Indicators and time schedule addressed	vx	if Yes, concrete measures	
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	Horizontal and vertical coordination measures as well as involvement of stakeholders	v	<ul style="list-style-type: none"> <li>Stakeholders and their responsibilities in broadband rollout in the Slovak Republic are described in NBP</li> <li>Coordination of different authorities in enhancing efficiencies and reducing administrative burdens as a target in the NBP</li> <li>Importance of ensuring central coordination in construction of regional networks</li> </ul>	v	<ul style="list-style-type: none"> <li>Assessing &amp; referencing to other existing parallel strategic policy frameworks for digital growth (i.e. the national and regional innovation strategic policy framework for smart specialisation)</li> <li>Appointing NASES (National Agency for Network and Electronic Services) as the main responsible authority in coordinating, construction and operation of the regional networks</li> </ul>	x	<ul style="list-style-type: none"> <li>Office of the Deputy Prime Minister of the Slovak Republic will provide central information society will provide central management and coordinating the implementation of tasks in the areas information society and policy development of the digital single market</li> </ul>	v	<ul style="list-style-type: none"> <li>Office of the Deputy Prime Minister of the Slovak Republic will provide central information society will provide central management and coordinating the implementation of tasks in the areas information society and policy development of the digital single market</li> <li>Furthermore detailed monitoring for achieving the objectives will be coordinated by four institutions (Ministry of Finance, Ministry of Transport, Construction and Regional Development, the Telecommunications Office and NASES)</li> </ul>
			Monitoring and updating mechanism (i.e. interim assessments)	v	<ul style="list-style-type: none"> <li>The NBP sets midterm objectives concerning the frequency release as well as universal service by 2013 (already fulfilled)</li> <li>A mechanism is set for regular monitoring and update of the NBP</li> </ul>	v	<ul style="list-style-type: none"> <li>Publication of information through the internet portal (database of availability of broadband connection, database of providers of broadband access).</li> <li>Annual publication of the monitoring report on achieved results and the effectiveness of taken measures of the Broadband Strategy</li> </ul>	v	<ul style="list-style-type: none"> <li>The NBP sets measurable targets and quantitative indicators for all the priority actions</li> </ul>	v
	Regulation (i.e. access obligations, regulated prices and reference offers)	v	Creating a new stable regulatory environment for broadband is one of the main measures in the NBP	v	<ul style="list-style-type: none"> <li>The NBP provides information on the key legislative requirements and their implementation in the period of 2014–2020 (i.e. regulation and rules for building and sharing of infrastructure, access prices and non-discriminatory access regimes)</li> </ul>	v	<ul style="list-style-type: none"> <li>The NBP sets timeliness for regulatory amendments</li> </ul>	v	<ul style="list-style-type: none"> <li>The NBP sets timeliness for regulatory amendments</li> </ul>	v

## Slovakia – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP		Responsibilities and monitoring mechanism addressed		
	Measures	How are the measures addressed ?	Implementation of measures addressed			Indicators and time schedule addressed	
			√x if Yes, concrete measures	√x if Yes, concrete measures			
SUPPLY SIDE MEASURES	Funding and financing	Measures/Plan for public investments	√ There are two main broadband programmes for achieving DAE objectives using public funding: – Operational Programme Integrated Infrastructure (OPII). – Rural Development Programme (RDP).	√ Building regional networks will be carried out through public tenders with private construction companies. Building local access networks will be carried out by operators	√ The NBP provides a table of activities, their projected budget and planned schedule for implementation	√ NASES in cooperation with the Ministry of Finance monitoring the realization process	
		Available budgetary resources (their share & adequacy)	√ Budgeting and prioritization of actions by relevance provided by the NBP	√ The NBP proposes measures concerning the appropriate funding tools for each of the investment priorities	√	√	
		Description of potential/preferred business models	√ The NBP introduces 5 different investment models in accordance with the EU guidelines together with good examples of implementation of these models in different MSs	√ Compatibility of the models addressed in the NBP in accordance with the size of the area, economic status and investment volume – Public DBO as a preferred investment model – In rural areas with low population density, the demand driven (community broadband) approaches are the proposed solution by the NBP	√	√	√
		Measures to stimulate private investment	√ Private investment contribution is of high priority in achieving the targets and according to the NBP, access networks should be financed from private sources	√ Regional networks built from public funds must be open to all providers of broadband services. The aim is to motivate commercial operators to complete the necessary access networks. – Regulatory measures should be put in place providing conditions for stimulating the competition (i.e. regional networks built by state support must be accessible to all potential operators who are interested in completing the last mile connectivity) – Cost-oriented pricing regime for wholesale access to national & regional networks	√	√	√
		Investment priorities (i.e. in rural & remote areas)	√ Investment priorities for the future development of information society in Slovakia, defined in this strategic document are: – e-services to citizens and businesses; – an effective public administration; – broadband/NGN (with the focus on white and grey spots)	√ Establishing the Rural Development Programme (RDP) complementing the operations within OPII and contributing to the goal of 100 % coverage of broadband	√	√	√
		Promotional measures	√	√	√	√	√
		Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	√ Mobile and wireless technology as complementary solutions to fixed networks	√ Enabling the nation-wide coverage and auctioning the harmonized 800 and 2600 MHz frequency bands. – Because of the large investment and minimum return, the NBP proposes to use wireless technologies for the remaining 9% of white areas.	√	√	√ NRA as the main regulatory authority
Fixed broadband technology focus/priority	√ Fiber optic network as a preferred technology for building regional networks	√ The NBP provides information on different suitable types of architecture of NGN networks based on fiber technologies	√	√	√		

## Slovakia – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
	Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
			√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures	√x if Yes, concrete measures		
TRANSPARENCY MEASURES	Mapping system	<p>Coverage and service mapping tool</p> <p>√</p>	<p>The NBP addresses the necessity of a mechanism to continuously monitor the coverage of broadband (in identification of white areas)</p> <p>x</p>	x	x	x		
		<p>Infrastructure mapping showing the existing private and public networks and planned investments</p> <p>√</p>	<p>Atlas of passive infrastructure addressed in the NBP as one of the main tools to enhance the use of existing infrastructure</p> <p>√</p>	<p>To make the best use of synergies, a technical infrastructure atlas will be established containing information on telecommunications lines (mobile and fixed) as well as the latest data on other lines and facilities (i.e. transport and utility networks)</p> <p>√</p>	<p>The preparation of the atlas is planned to be completed in 4 years starting from 2014</p> <p>√</p>	<p>Atlas of passive infrastructure will be implemented by the Ministry of Transport, Construction and Regional Development.</p> <p>√</p>		
		<p>Use of existing infrastructure</p> <p>√</p>	<p>Creating efficient sharing and open access environment</p> <p>√</p>	<p>The obligation of leaving free space for additional cables when laying passive infrastructure</p> <p>– Atlas of passive infrastructure</p> <p>√</p>	x	x		
		<p>Coordination of civil works</p> <p>√</p>	<p>Ensuring effective coordination of civil engineering works</p> <p>√</p>	<p>A central information center of planned civil work with the aim of informing businesses about the possibilities of joint construction</p> <p>√</p>	x	x		
		<p>Permit granting and electronic counters</p> <p>√</p>	<p>Efforts to upgrade the coordination of activities across the public administration, which uses common standards and architecture solutions, open source community and public crowdsourcing</p> <p>√</p>	<p>e.g. simplifying and speeding up licensing arrangements for the construction of masts and antennas in accordance with the proposal of the European Commission</p> <p>√</p>	x	x		
	DEMAND SIDE MEASURES	Demand stimulation	<p>Building readiness</p> <p>√</p>	<p>The obligation of the installation of broadband infrastructure in new buildings and refurbished buildings</p> <p>√</p>	<p>– Amending the Building Act with the requirement for the existence of high-speed networks for newly constructed buildings or the renovation of buildings</p> <p>– Requirements for creating infrastructure maps in newly constructed buildings</p> <p>√</p>	x	x	
			<p>Public services connectivity (i.e. schools, libraries etc.)</p> <p>√</p>	<p>Covering public services i.e. education centers such as schools and libraries are prioritized in the NBP</p> <p>x</p>	x	x		
			<p>Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)</p> <p>√</p>	<p>The NBP emphasizes that Slovakia should take active steps in increasing the affordability of broadband with speeds greater than 30 Mbps and spreading ways and means to achieve this connection. It also sets measures to encourage the involvement of all citizens in the digital single market</p> <p>√</p>	<p>– Programmes for disadvantaged groups and actively improve their skills in information technology (e.g. lifelong learning programmes)</p> <p>– Engaging citizens through multiple channels to process improvement of services and get feedback</p> <p>– Ensuring personalized contact with the public administration through credible, practical and secure identity tools</p> <p>– Enabling citizens and disadvantaged groups to engage in actions and decision-making processes</p> <p>– Creation of simplified and personalized services aimed at disadvantaged groups</p> <p>– Establishing an innovation center</p> <p>– Preserve the affordability of superfast internet (i.e. gradual reduction of prices for ICT services)</p> <p>– Targeted information campaigns</p> <p>√</p>	<p>The NBP sets measurable targets and quantitative indicators for all the priority actions</p> <p>√</p>	<p>Roles and responsibilities of different actors are addressed in the NBP</p> <p>√</p>	
			<p>Measures for stimulating the benefit of superfast internet (i.e. in business &amp; research, e-administration, e-services etc.)</p> <p>√</p>	<p>Increasing broadband coverage, enhancing the quality of services, standards and accessibility of e-Government services for businesses and citizens are topics addressed in the NBP</p> <p>The NBP sets measures for:</p> <ul style="list-style-type: none"> <li>– Innovation for electronic services</li> <li>– Increasing level of e-commerce and e-businesses</li> </ul> <p>√</p>	<p>– E-services to citizens and businesses &amp; an effective public administration are two main investment priorities addressed in the NGN strategy</p> <p>– The NBP proposes a step by step roadmap for further development of e-Government (as well as e-services) and e-economy</p> <p>– Smart specialization strategies linked to the NBP</p> <p>– Direct aid for research institutes and SME to further work on open data</p> <p>– Reducing the administrative burden on businesses (introducing a transparent and credible public administration)</p> <p>– Modernizing public procurement platform</p> <p>– Establishing innovation center</p> <p>– Creation and expansion of a central access point to the services and information of public administration</p> <p>√</p>			



## Slovenia – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
	Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
			✓x if Yes, concrete measures	✓x if Yes, concrete measures	✓x if Yes, concrete measures	✓x if Yes, concrete measures		
Funding and financing	Measures/Plan for public investments	<ul style="list-style-type: none"> <li>✓ The Slovenian NBP believes that the use of public funds is essential for construction of broadband in white areas</li> <li>– It considers the use of ERDF and EAFRD in co-financing the broadband development with an emphasis on areas where the market does not provide high quality &amp; open infrastructure at an affordable cost</li> <li>✓ The NBP provides detailed information on the sources and amount of already invested as well as future investment in the area of broadband</li> </ul>	✓	<ul style="list-style-type: none"> <li>– The use of public funds is only allowed where the infrastructure is not available and where there is no market for private investment</li> <li>– Full application of EU legislation, recommendations and state aid rules in relation to co-financing the construction of broadband</li> </ul>	✓	<ul style="list-style-type: none"> <li>– The NBP provides criteria /indicators for areas eligible for public investment. (definition of black, grey and white areas)</li> <li>– It also provides a list of selection criteria for projects (i.e. highest possible private input, use of existing networks and lowering the cost, using synergy effects, I13 etc.)</li> </ul>	✓	The NBP addresses measures on monitoring mechanism and the return of funds (as well as its transparency)
	Available budgetary resources (their share & adequacy)	<ul style="list-style-type: none"> <li>✓ The NBP provides detailed information on the sources and amount of already invested as well as future investment in the area of broadband</li> </ul>	✓	Emphasis on using state aid (i.e. ERDF & EAFRD) in the form of co-financing	✓	Tables showing the amount of projected funding, estimated potentials of private investments and number of connections	✓	
	Description of potential/preferred business models	<ul style="list-style-type: none"> <li>✓ Public private partnership mechanisms are preferred models by the NBP especially for stimulating broadband development activities in less developed areas</li> </ul>	✓	The NBP proposes workflows and processes concerning PPP models (especially with the contribution of municipalities)	✓		✓	
	Measures to stimulate private investment	<ul style="list-style-type: none"> <li>✓ The NBP believes that the development of broadband infrastructure requires significant investment, which will not be realized without private capital</li> </ul>	✓	<ul style="list-style-type: none"> <li>– Setting regulatory frameworks ensuring competition</li> <li>– Setting competitive selection processes</li> <li>– Testing market interest before the realization of the plan</li> <li>– Providing a fair and non-discriminatory treatment environment</li> <li>– Regulatory framework on the ownership of the infrastructure</li> <li>– Tracking the private investment interest on deployment projects (i.e. AKOS (the NRA) on its website set up a thematic section “calls for investors” which monitors private investment interest in broadband projects)</li> </ul>	✓		✓	
	Investment priorities (i.e. in rural & remote areas)	<ul style="list-style-type: none"> <li>✓ Rural and dispersed areas are of high priority in the NBP</li> </ul>	✓	<ul style="list-style-type: none"> <li>– Mobilization of the additional fund to encourage private investment</li> <li>– The NBP's desired approach for investing in rural areas is to favour final longterm solutions providing broadband infrastructure over intermediate solutions requiring updates soon (for more efficient use of public funds)</li> </ul>	✓		✓	
Technology	Promotional measures	<ul style="list-style-type: none"> <li>✓ Both fixed and wireless networks are considered as suitable technologies</li> </ul>	✓	<ul style="list-style-type: none"> <li>– Implementation of the European Spectrum Policy Programme to ensure internationally coordinated allocation</li> <li>– In the coming years plans to grant new free radio frequencies in the bands 700 MHz, 1400 MHz, 1800 MHz, 2100MHz, 2300 MHz, 3500 MHz and 3700 MHz.</li> <li>– Enable a publicly accessible &amp; free WLAN hotspot with limited access time by Public-Private Partnership mechanisms</li> </ul>	✓		✓	AKOS (the NRA) as the main responsible authority
	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	<ul style="list-style-type: none"> <li>✓ The NBP introduces different fixed technologies capable for NGA networks and emphasizes the fiber (especially FTTH) as a sustainable long term solution</li> </ul>	✓		✓		✓	
	Fixed broadband technology focus/priority	<ul style="list-style-type: none"> <li>✓ The NBP introduces different fixed technologies capable for NGA networks and emphasizes the fiber (especially FTTH) as a sustainable long term solution</li> </ul>	✓		✓		✓	

## Slovenia – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP				Responsibilities and monitoring mechanism addressed	
		How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	if Yes, concrete measures		if Yes, concrete measures		
Topics		Vx	Vx	Vx	Vx	Vx	Vx	Vx	Vx
TRANSPARENCY MEASURES	Mapping system	V	Detailed mapping and coverage analysis for determination of white areas mentioned in the NBP	x		x		V	AKOS (the NRA) as the main responsible authority
		V	Analysis of the mapping of the existing electronic communications infrastructure and data on population as well as information on mapping network termination points of all operators and network owners as an important measure addressed by the NBP	V	Setting up a cadastre of public infrastructure, in which operators provide information on their networks, so that all networks are enumerated in the public record	x		V	Surveying and Mapping Authority of the Republic of Slovenia
		V	The EU cost reduction directive is addressed in the NBP as one of the main measures to be fully implemented in the new programme period. Measures such as sharing existing passive infrastructure suitable for the needs of electronic communications, using synergy effects as well as modernizing installations in buildings are some examples addressed in the NBP.	V	<ul style="list-style-type: none"> <li>– Improving access regulations and joint use of infrastructure</li> <li>– Use of existing suitable infrastructure as one of the main criteria for allocating public funds</li> <li>– Setting up a cadastre of public infrastructure</li> </ul>	x		V	The Cost reduction Directive falls within the scope of the Ministry of Education, Science and Sport
	Cost reduction	V	Coordination of civil works	V	<ul style="list-style-type: none"> <li>– Investments in other public utility infrastructure (eg. smart grids, water supply network)</li> <li>– Information on planned investments in electronic communications operators and network owners in fixed broadband infrastructure</li> <li>– Setting up a cadastre of public infrastructure</li> </ul>	x		V	
		V	Permit granting and electronic counters	x		x		V	
		V	Building readiness	V	Providing central entry point in multi dwelling buildings as well as commercial/public buildings allowing different operators to connect each part of the building separately	x		V	
DEMAND SIDE MEASURES	Demand stimulation	V	Connecting public institutions i.e. education, science, sport and culture are of high priority in the NBP	x		x		x	
		V	The NBP considers broadband access as one of the main basic needs of modern society and therefore lays emphasis on reducing the digital divide and to provide equal access to broadband services	V	Public-Private Partnership must enable a publicly accessible & free WLAN hotspot with limited access time	x		x	
		V	The NBP foresees that the future economy will be a knowledge-based economy, based on ultrafast networks	x	<ul style="list-style-type: none"> <li>– Providing conditions for electronic government services and other public services (e.g. e-Health) are of high priority in the NBP</li> </ul>	x		x	

### Spain – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP							
		How are the measures addressed ?		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
Topics		Vx		Vx	if Yes, concrete measures	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures		
REGULATORY & ORGANISATIONAL MEASURES	Organization & management	V	Horizontal and vertical coordination measures as well as involvement of stakeholders	V	Wide collaboration and coordination with regional and local governments to fasten and cheapen the network deployment as one of the main priorities in the NBP	V	Establishment of the coordination mechanisms (rules, guidelines) to standardize the conditions and procedures (i.e. for local and regional authorities) Setting up a participatory process, i.e. the action plans toward the Digital Agenda Spain are available for feedback and contribution of different actors (to be amended in the annual updates up to 2020)	V	Timelines are set	V	The Secretary of State for Telecommunications and Information Society as the responsible authority
		V	Monitoring and updating mechanism (i.e. interim assessments)	V	General terms and conditions are specified	V	An annual review report is foreseen to monitor and assess the results achieved	V	Measurable indicators as well as the timelines are addressed	V	
	V	Regulation (i.e. access obligations, regulated prices and reference offers)	V	Regulatory frameworks are one of the fundamental factors for implementation of the plan. The plan proposes revision of the current regulations	V	Changing regulations (improving the Telecommunication Act) aimed at reducing deployment costs, facilitate use of infrastructure already available and removing barriers for the deployment ultra-fast networks.	x		x		x

## Spain – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
		How are the measures addressed ?	Implementation of measures addressed	Indicators and time schedule addressed	Responsibilities and monitoring mechanism addressed					
Topics		✓x	✓x if Yes, concrete measures	✓x if Yes, concrete measures	✓x if Yes, concrete measures	✓x if Yes, concrete measures				
Supply Side Measures	Funding and financing	Measures/Plan for public investments	✓	Public funding sources especially in less developed areas as well as small and medium sized settlements	✓	– Funding programmes in the form of grants and credits to the operators for investment in network deployment projects – A periodical tendering/call mechanism for projects submission	✓x	X		
		Available budgetary resources (their share & adequacy)	✓	The amount and sources of the funding measures are addressed in the NBP	X			X		
		Description of potential/preferred business models	✓		X				X	
		Measures to stimulate private investment	✓	Encouraging the investment in broadband networks is considered as one of the main aims of the plan	✓	– Simplification of the administrative procedures (i.e. changing rules aimed at simplifying the requirements for deployment and installation of mobile networks) – Reducing the cost for broadband development by launching new regulatory frameworks	✓		X	
		Investment priorities (i.e. in rural & remote areas)	✓	– Focus on digital divide (unserved areas) – Modernization of the existing networks	✓	Three action lines are foreseen in the NBP: – Superfast networks (> 100 Mbps) in small and medium sized settlements without NGA coverage – Extending the links to backbones suitable for NGA networks – Extending the NGA network to areas with poor coverage where no private investment is foreseen	✓		X	
		Promotional measures	✓		X				X	
Technology	Technology	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	✓	– Both fixed and mobile networks are considered as technologies to achieve the DAE target – Axis II of the NBP focuses on measures to accelerate coverage of ultra-fast mobile access networks (The new mobile wireless technologies (LTE) will play an important role in achieving the objectives of the Digital Agenda)	✓	– Improving access for operators to new frequency bands – Simplifying the requirements for deployment procedures – Amending the telecommunication act concerning more efficient use of spectrum as well as an assessment of the possibilities for sharing the spectrum – Consideration of the EU harmonized spectrum policies	✓	The NBP provides measurable targets and timelines concerning the addressed measures	✓	The Secretary of State for Telecommunications and Information Society as the responsible authority
		Fixed broadband technology focus/priority	✓	Technology neutrality as a rule (with the focus on two types of fixed network namely HFC and FTTH)	X			X		



## Spain – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
Topics		Vx	How are the measures addressed ?	Vx	if Yes, concrete measures	Vx	if Yes, concrete measures		
TRANSPARENCY MEASURES	Mapping system	x	Developing a map of broadband coverage that accurately shows the current status of the provision of services and allows identification of the areas with market gaps	x		x			
		x	Establishing the registry of the existing and future planned infrastructure	x		x			
	Cost reduction	v	– Measures to facilitate the use/sharing of the existing infrastructure – Regulating the right of access by operators to telecommunication infrastructure and other infrastructure/utilities	v	– Legislative amendments to integrate the cost reduction measures – Registry of the existing and future planned infrastructure	v	There are timelines set for legal provisions	v	The Secretary of State for Telecommunications and Information Society as the responsible authority
		v	Enhancing coordination	v		v		v	
		v	Faster and easier administrative procedures by establishing a single point of electronic information	v		v		v	
	Building readiness	v		x		x			
DEMAND SIDE MEASURES	Demand stimulation	x	The NBP dedicates its' third axis to demand stimulation measures. Furthermore, it references to the specific correlated demand side action plans in the frame of the digital agenda Spain.	v	Launching thematic action plans in the frame of the digital agenda Spain programme: – ICT in SMEs and e-Commerce Plan – Digital Content Industry Comprehensive Plan – Technological Companies Internationalization Plan	v	Indicators as well as timelines for each of the thematic areas are addressed	v	Monitoring mechanism (i.e. progress reports) are foreseen
		v		v		v		v	
		v	Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	v	– General State Administration's e-Government Action Plan – Digital Public Services Plan – Digital Ecosystem Confidence Plan – ICT Sector development and Innovation Plan – Digital Inclusion Plan	v		v	

### Sweden – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP			
		How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed
			√x	if Yes, concrete measures	√x	if Yes, concrete measures	
Topics	REGULATORY & ORGANISATIONAL MEASURES	<p><b>Horizontal and vertical coordination measures as well as involvement of stakeholders</b></p> <p><b>Monitoring and updating mechanism (i.e. interim assessments)</b></p> <p><b>Regulation (i.e. access obligations, regulated prices and reference offers)</b></p>	<p>√</p> <p>– The role of central government is to ensure well functioning markets and favourable business conditions throughout the country</p> <p>– Important role of regional and local authorities in the process of broadband development</p>	<p>√</p> <p>– Role and responsibilities of municipalities in the process of broadband deployment are emphasized (i.e. by explaining the municipal city network model)</p> <p>– Establishing the “Broadband Forum” for collaboration and dialogue on the deployment of broadband</p> <p>– Publishing examples of best practice in collaboration between private and public–sector players</p>	<p>x</p>	<p>√</p> <p>The role of different national and local authorities (i.e. the government, public sector, market players, research society and civil society) are briefly addressed in the NBP</p>	
			<p>√</p> <p>The NBP sets interim targets (i.e. for 2015) to provide 100 Mbps for 40% of households and businesses. It also proposes mechanisms for regular monitoring of the development</p>	<p>√</p> <p>– The Swedish Post and Telecom Agency has been tasked for several years with monitoring broadband deployment in Sweden and annually reporting the results to government</p> <p>– The government agencies or other bodies responsible for work on regional growth should monitor regional access to broadband</p>	<p>x</p>	<p>√</p> <p>The Swedish Post and Telecom Agency in cooperation with regional authorities</p>	
			<p>√</p> <p>Regulatory frameworks are considered as one of the main tools to promote infrastructure based competition</p>	<p>√</p> <p>– Putting relevant regulation in place towards stimulation of competition and better environment for market players</p> <p>– Amendments to the Planning and Building Act (i.e. further coordination between plans for the deployment of infrastructure and electronic communications technologies)</p>	<p>x</p>	<p>√</p> <p>The Swedish Post and Telecom Agency as the main responsible authority</p>	

## Sweden – All measures defined by NBP

Topics	Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
		✓/x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed ✓/x if Yes, concrete measures	
				✓/x	if Yes, concrete measures	✓/x	if Yes, concrete measures		
Supply Side Measures	Funding and financing	✓	The NBP sets measures and emphasizes the importance of public sources especially for broadband deployment in rural areas. It also provides information on the dedicated amount of structural funds.	x		x		x	
		x	Available budgetary resources (their share & adequacy)	x		x		x	
		✓	Description of potential/preferred business models	✓	Municipal city network is explained as a successful experience in Swedish cities	x		x	
		✓	Measures to stimulate private investment	✓	Stimulating the investment of market players addressed as a target in the NBP	x		x	
		✓	Investment priorities (i.e. in rural & remote areas)	✓	The main priority is to provide access to high speed internet to the whole territory (with the focus on rural areas)	x		x	
		x	Promotional measures	x		x		x	
Technology	Convergence of networks (i.e. mobile and satellite as complementary/bridging technologies)	✓	According to the strategy: – The Government's assessment is that the development of wireless technologies and wireless broadband will play a key role in rural/remote areas. Satellite broadband may also play a role in the most remote areas. – Wireless networks additionally provide added value in the form of greater mobility	✓	– The target is based on market investments being made in both fixed (fibre-based networks and cable networks) and wireless networks – Revised model for spectrum management (suitable frequency bands for electronic communications can be used for increased availability in areas that lack access to broadband or have broadband of low capacity and quality)	x		x	
		✓	Fixed broadband technology focus/priority	x		x		x	

## Sweden – All measures defined by NBP

Measures	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP					
	v/x	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed	
			v/x	if Yes, concrete measures	v/x	if Yes, concrete measures		
Mapping system	v	The importance of identifying where broadband is lacking and analysing the demand in order to provide operators with an overall picture of needs	x		x		x	Swedish Post and Telecom Agency with the support of municipalities, county administrative boards and bodies with responsibility for regional growth issues
	x	Publicly available information on planned excavations is of high priority mentioned in the NBP	x	Further development of central mapping tools such as Ledningskollen.se	x		x	
Cost reduction	v	– Enhancing the use of existing infrastructure as well as more effective coordination of planned excavation works	v	– Taking the initiative to build infrastructure when an energy company or an operator deploys infrastructure in an area	x		x	
	v	– It is cost-effective for broadband to be jointly laid or for duct for broadband (for example empty pipes) to be buried when electricity networks, water and sewerage, district heating or other infrastructure are expanded or upgraded	v	– Publication of information on existing network and planned excavations (through central tools such as Ledningskollen.se)	x		x	
Cost reduction	v	Shortening processing time and increased legal certainty are listed in the NBP aiming at increasing the efficiency of the processes	x		x		x	
Building readiness	x		x		x		x	
Public services connectivity (i.e. schools, libraries etc.)	x		x		x		x	
Demand stimulation	v	The NBP considers that internet and broadband are significant to the development of a sustainable society. Customer demand, the development of new services and the competitive situation will drive the investments in networks that permit higher speeds	v	Stimulating the willingness to participate and pay for network deployment	x		x	
	v	– Several areas of entrepreneurship, environment, education, health and social care and administration are addressed in the NBP – The NBP states that all households and businesses should have good opportunities to use electronic public services with broadband access	v	– The NBP provides some examples of the use of ICT in businesses, healthcare and education (as good practices) – Setting up “e-delegation” to pursue the objectives of e-government – Establishing the national IT strategy for health and social care (via a joint effort of central government, municipalities and county councils)	x		x	

## United Kingdom – All measures defined by NBP

Measures		A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP		Responsibilities and monitoring mechanism addressed		
		How are the measures addressed ?	√x	Implementation of measures addressed	√x	Indicators and time schedule addressed	√x	if Yes, concrete measures
Topics	Measures	Horizontal and vertical coordination measures as well as involvement of stakeholders	√	The NBP emphasizes the role of local authorities in the process of broadband development	√	Local public authorities or the devolved administrations are responsible for management of their local broadband projects (They have an important role in supporting deployment by assisting with issues such as planning, streetworks, and way-leaves) – Regional meetings, briefings and expert reports which allow BDUK to promote best practice, share knowledge, discuss common issues and to give advice	√	The programme is managed by Broadband Delivery UK (BDUK), part of the Department for Culture, Media and Sport (DCMS)
		Monitoring and updating mechanism (i.e. interim assessments)	√	Regular monitoring of the projects are emphasized in the NBP	√	– An openbook accounting process (known as 'Milestone to Cash') has been put in place which gives each local project team complete visibility of network delivery and the costs for each projects in the programme) – BDUK visits all local bodies to assess and support assurance processes – Quarterly cost comparison reports for each local project, which compare key measures with the equivalent data from all local bodies (supplemented by BDUK's value-for-money team having individual tailored discussions on these reports)	√	
		Regulation (i.e. access obligations, regulated prices and reference offers)	√	Regulatory frameworks, especially access obligations are of high importance in the NBP	√	The Government is in the process of reforming the UK Electronic Communications Code, the statutory regime which governs the rights of communications infrastructure providers to deploy and maintain electronic communications infrastructure on private land	x	x
REGULATORY & ORGANISATIONAL MEASURES								

## United Kingdom – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP							
	Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed			
			√x	if Yes, concrete measures	√x	if Yes, concrete measures	√x	if Yes, concrete measures		
Supply Side Measures	Funding and financing	Measures/Plan for public investments	√	<ul style="list-style-type: none"> <li>According to the NBP, through local projects with local authorities and the devolved administrations, the public sector is investing over £1.7 billion in improving broadband through the Superfast Broadband Programme</li> <li>NBP provides the list of local projects funded through public resources</li> <li>The Government has provided support to a number of local community projects through the Rural Community Broadband Fund (RCBF, now closed)</li> </ul>	√	<ul style="list-style-type: none"> <li>The NBP provides assessment criteria for projects seeking to use public funding</li> <li>Where projects have government funding, BDUK undertakes six monthly assurance reviews to ensure that delivery is on track and that any risks to delivery are being managed and mitigated as appropriate.</li> </ul>	√	<ul style="list-style-type: none"> <li>The programme is managed by Broadband Delivery UK (BDUK), part of the Department for Culture, Media and Sport (DCMS). BDUK has a comprehensive project assurance system to ensure that projects with government funding meet the criteria</li> </ul>		
		Available budgetary resources (their share & adequacy)	√	<ul style="list-style-type: none"> <li>The NBP provides general information on the available budgetary sources for the broadband development programme</li> <li>The Department for Environment, Food and Rural Affairs (Defra) is also making further support available to broadband projects in areas not covered by current programmes, using funding from the Growth Programme as part of the Rural Development Programme for England 2014-20, under the European Fund for Agricultural Fund for Rural Development (EAFRD)</li> </ul>	x		x			
		Description of potential/preferred business models	√	<ul style="list-style-type: none"> <li>The NBP introduces 4 business models in accordance to the European commission guide:                             <ul style="list-style-type: none"> <li>Direct investment (also known as public design build and operate)</li> <li>Indirect investment (also known as public outsourcing, or concession model)</li> <li>Support of community-led initiatives</li> <li>Operator subsidy (also known as gap-funding or private design build and operate)</li> </ul> </li> </ul>	√	<ul style="list-style-type: none"> <li>Most projects which have gone ahead in the UK have used the gap funding model</li> </ul>	x		x	
		Measures to stimulate private investment	√	<ul style="list-style-type: none"> <li>The Government is implementing a range of measures to facilitate private investment by helping to reduce the cost and to speed up broadband deployment</li> </ul>	√	<ul style="list-style-type: none"> <li>In 2013 the Government introduced changes to the planning system in England through primary and secondary legislation. The requirement to seek planning authority approval for the siting and appearance of broadband cabinets was removed in all protected areas, except for Sites of Special Scientific Interest (SSSIs). Secondly the requirement to underground new telecommunications lines was removed, allowing new poles and overhead lines to be deployed in all areas (again, except SSSIs).</li> <li>The Government also brought forward a substantial package of planning relaxations in 2013 to support the rollout of superfast mobile broadband by allowing existing masts to be extended in non-protected areas and additional mobile infrastructure to be deployed on existing buildings.</li> <li>Amendments concerning the right of communication infrastructure to deploy and maintain electronic communications on private land D. Cost reduction measures</li> </ul>	√	<ul style="list-style-type: none"> <li>Measure A is expected to run till 2018</li> </ul>	√	<ul style="list-style-type: none"> <li>Measure A. the government will review the effectiveness of the changes early in the next Parliament to determine whether they should be made permanent</li> </ul>
		Investment priorities (i.e. in rural & remote areas)	√	<ul style="list-style-type: none"> <li>The programme is being delivered in three phases:                             <ul style="list-style-type: none"> <li>Phase 1 aims to provide superfast broadband coverage to 90% of UK homes and businesses by early 2016 and provide access to standard broadband (2Mbps) for all</li> <li>Phase 2 aims to provide superfast broadband coverage to 95% of the UK by 2017</li> <li>Phase 3 is testing options to extend superfast broadband coverage beyond 95%</li> </ul> </li> </ul>	x		x		x	
Technology		Promotional measures	√	<ul style="list-style-type: none"> <li>The Government has been supporting business connectivity in cities through provision of connection vouchers to SMEs, as part of the Super-Connected Cities Programme.</li> </ul>	x		√		√	<ul style="list-style-type: none"> <li>The programme has been managed by BDUK</li> </ul>
		Convergence of networks (i.e. mobile and satellite as complementarily/bridging technologies)	√	<ul style="list-style-type: none"> <li>According to the NBP, wireless and satellite solutions could also be of importance</li> </ul>	x		x		x	
		Fixed broadband technology focus/priority	√	<ul style="list-style-type: none"> <li>The Government takes a technology neutral approach to provision of superfast broadband networks</li> </ul>	x		x		x	

## United Kingdom – All measures defined by NBP

Topics	A. Topics/measures covered by NBP		B. Operationalization Level of proposed measures by NBP						
	Measures	How are the measures addressed ?	Implementation of measures addressed		Indicators and time schedule addressed		Responsibilities and monitoring mechanism addressed		
			√x	How are the measures addressed ?	√x if Yes, concrete measures	√x if Yes, concrete measures		√x if Yes, concrete measures	
TRANSPARENCY MEASURES	Mapping system	Coverage and service mapping tool	x		x		x		
		Infrastructure mapping showing the existing private and public networks and planned investments	x		x		x		
	Cost reduction	Use of existing infrastructure	√	– EU Directive on measures to reduce the cost of deploying high-speed electronic communications networks is addressed in the NBP, aiming at assessing the steps it needs to take to implement the EU Directive	x		x		
		Coordination of civil works	√	– The Government is actively encouraging the adoption of a range of innovative approaches in street works, particularly where deployment methods such as narrow trenching and the use of approved materials like foamed concrete, have the effect of lowering costs and speeding up deployment of superfast broadband.	√	The Government is also encouraging local highway authorities to work collaboratively with infrastructure providers to help expedite broadband roll out	x		
		Permit granting and electronic counters	√		x		x		
		Building readiness	√		√	A voluntary broadband-ready label should apply on new buildings and apartments with access to high-speed in-house broadband infrastructure	x		
DEMAND SIDE MEASURES	Demand stimulation	Public services connectivity (i.e. schools, libraries etc.)	x		x		x		
		Measures on stimulating the demand for superfast internet (i.e. digital literacy etc.)	√	Stimulating broadband take up is addressed as one of the main aims of NBP	√	– At national level a major marketing campaign to raise consumer awareness for superfast broadband and to provide information on its benefits and availability has been undertaken (This enables them to see whether they currently have coverage and, if not, what the plans are for their area. There is also information on the benefits of superfast broadband for both household and business users) – Digital inclusion is tackled through the Government Digital Inclusion Strategy – As a requirement of government funding, local broadband projects also need to set out how they will promote take-up as part of their Local Broadband Plans	x		
		Measures for stimulating the benefit of superfast internet (i.e. in business & research, e-administration, e-services etc.)	√	– The NBP emphasizes the importance of superfast broadband in supporting business growth and local job creation, particularly in rural areas, making it easier for people to get into work by allowing for more flexible working patterns – It also addresses that broadband enables new ways for people to gain access to health and social care in their homes and provides new opportunities for access to education	√	– Supporting the development of new, more efficient, business models, enabling business process re-engineering to improve the efficiency – Business use of Information and Communications Technology is promoted through the Government's Strategy for the Information Economy – Connection vouchers for SMEs – Local broadband projects receiving funding from the European Regional Development Fund also have programmes to promote take-up by SMEs	√	– The NBP sets a measurable target that by 2015, 33% of Small and Medium-sized Enterprises (SMEs) to make online sales by 2015	x

European Commission

**Study on national broadband plans in the EU-28 – Final Report**

Luxembourg, Publications Office of the European Union

**2014** – 320 pages

ISBN 978-92-79-66284-3

doi: 10.2759/340045



